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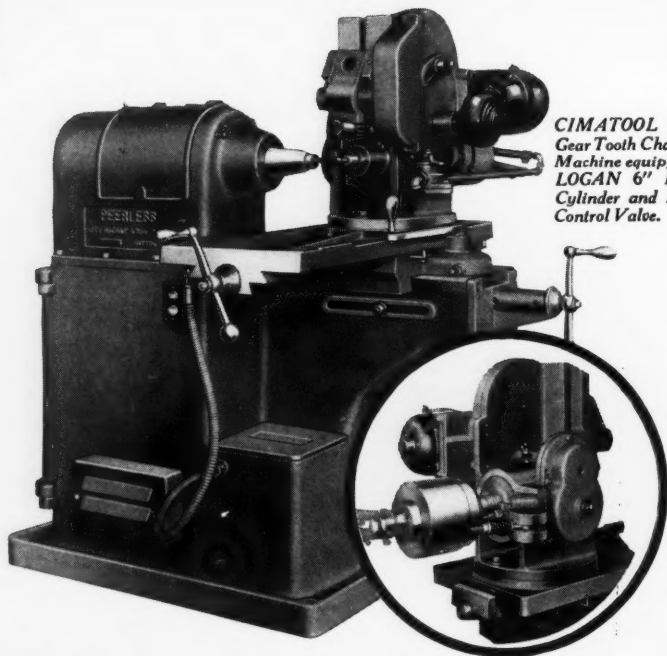
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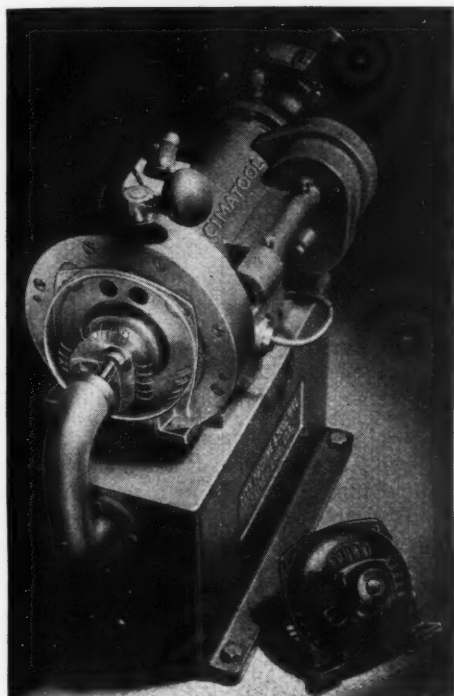
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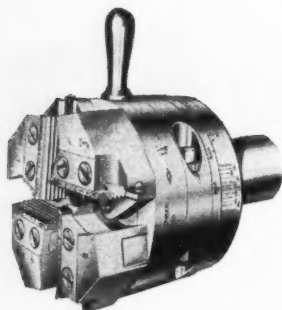


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# MODERN Machine Shop

HOWARD CAMPBELL, Editor

Volume 5

DECEMBER, 1932

Number 7

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Magazine  
for  
Machine  
Shop  
Executives



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# MODERN Machine Shop

DECEMBER, 1932

CINCINNATI, OHIO

VOL. 5, No. 7

## Maintaining Production Schedules at the Master Electric Co.



*"A Study in Modern Manufacturing Methods"*

By HOWARD CAMPBELL

THIS is the story of an organization which, in the face of conditions that have existed for the past three years, has maintained a production schedule approximating normal. The organization is The Master Electric Company of Dayton, Ohio, and the development which has kept their plant in operation and their manufacturing organization intact has been a much-needed item of machine and factory equipment — the Master Geared-Head Motor—added to the standard and

accepted line of regulation motors the company makes.

More than seven years ago now, The Master Electric Company produced the first real geared motor, as differentiated from what had been built at some earlier time—a back-

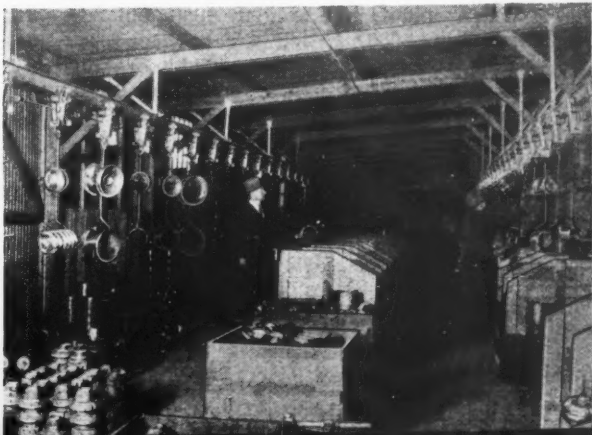


Fig. 1—The overhead conveyor starts the castings on their way to the machine shop at the exact minute required for production.

geared motor. As pioneers in combining motor and gearing into one compact, efficient unit, difficulties aplenty had to be overcome. Just how successful their effort has been to perfect an integral speed reducer, or accelerator, in combination with the various types of Master Motors may

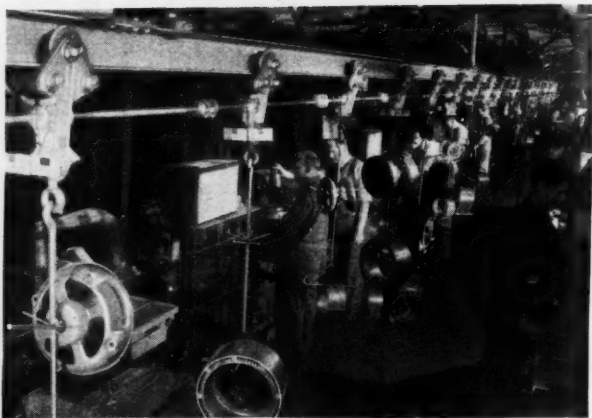


Fig. 2 (Above)—As the castings pass the machine operators, each operator removes the pieces intended for him. Fig. 3 (Left)—Here the iron for each motor is weighed out to insure that the motor will operate at its highest efficiency.

be judged from the necessary increase in production facilities at the Master plant, not only in 1929, but even in 1930. Their Geared-Head Motors have become more and more an important part of production as the demands of depression for better performance and lowered costs forced the redesign of motor-driven machines.

But this is the story of the production schedules which have made it possible for The Master Electric Company to control production, to time deliveries, and to exercise the closest supervision over every phase of their

manufacture. The story of their commercial accomplishment during the past several years is another story. Even the story of their scheduling system, which provides for the flow of every part entering into their manufacture in such synchronized and co-ordinated manner that the finished piece—even though individually engineered and designed—arrives at the shipping room within six minutes of scheduled time, will have to be made the subject matter of a future article in this magazine.

Starting with their own foundry where absolute control of quality and material up to the capacity of 35 tons of finished castings per day become a feature worthy of consideration, the major products of the great Master plant consist of electric motors which, although having special features, are manufactured on a quantity production basis. The elaborate "timed" conveyor system, which immediately attracts the admiration of any produc-

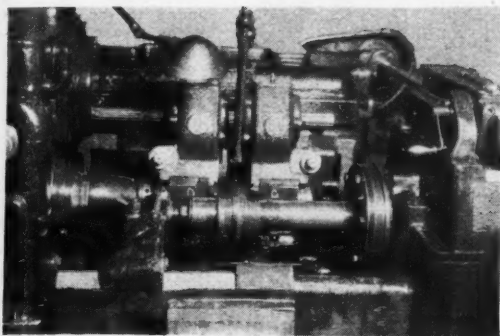
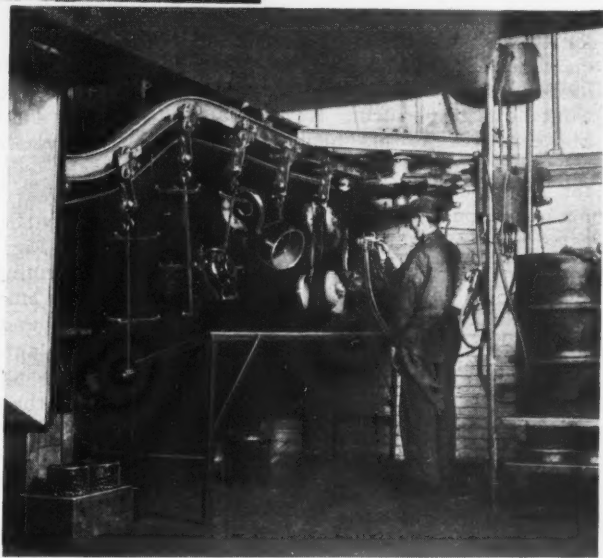


Fig. 4 (Above) — This machine cuts the teeth of the herringbone gears. The design of the tooth eliminates end thrust and insures practically noiseless operation. Fig. 5 (Right) — As the parts pass this operator, they are sprayed with a special high-gloss, non-cracking, non-chipping black enamel.

tion executive, is merely the outward manifestation of the unseen system of production scheduling and planning. Yet to watch the operation of this system in compelling unflinching compliance with predetermined "timing" is a revelation in the economy and efficiency that American industry has achieved under the stress of necessity.

This conveyor system throughout the plant—either overhead, belt, slat or whatever other type is best suited to the work in any particular department — was designed and built complete in their own shops and production parts from every source are moved on it in continuous progress with no necessity for the accumulation of storage in any department.

Between the foundry and the machine shop is the only storage room, aside from other raw materials, in the plant. Figure 1 shows this reservoir of castings taken from the foundry to be held until exactly the minute they are required for production. Orders for castings come from the production department on cards, each card carrying



the order number and calling for the required number of parts of a kind for one motor; thus all parts required for a motor are scheduled for a given customer from the time they leave raw stock storage. Every single motor has an individual traveler card during its entire progress.

As orders are received in the castings storage, the parts called for are hung on the hooks of an overhead conveyor which traverses the entire length of several lines of machines in



Fig. 6—The winding department is completely conveyorized, the parts coming to the operators at the exact speed required to maintain the production schedule.

the machine shop. Before any part reaches him, each machine operator receives blueprints and specifications for all the parts that will come to his machine and his tools and equipment are ready beforehand for all the work he is to perform. As the parts are conveyed to his machine, each operator removes those intended for him and when he has completed his operation, returns the part to the same hook on the conveyor. A view of machine shop No. 1 is shown in Fig. 2.

Starting from another direction and converging with the machine shop output later, the punch press conveyor brings stator and rotor iron after stamping to the bench room shown in Fig. 3. Here the iron for each motor is weighed and balanced against a master of the same type and size to insure each motor having exactly the right amount. As fast as weighed out, the next operator slips the stator laminations over an arbor and an air-operated press compresses the mass before welding. Placed in a compart-

ment on a revolving shelf shown at the rear in the illustration, the stator passes into the welding booth where the welder, by welding a bead down each of the four corners, effectively locks the iron together without the use of a single bolt or nut.

All shafts and gears are produced from still a third direction, their conveyor traversing the long batteries of automatic screw machines and specialized gear hobbers to return the finished parts in exact time for assembly. Fig. 4 shows one of the Farrel-Birmingham machines producing a high efficiency herringbone gear. All gears and splines are cut in the Master plant from materials over which the utmost control is exercised and the design and development of gears for Master Geared-Head Motors represents the latest practices in gear engineering which have re-



Fig. 7—An automatic winding armature machine, with an armature for a  $\frac{1}{2}$ -h.p. motor ready to be wound. The machine stops automatically when the correct number of turns have been made.



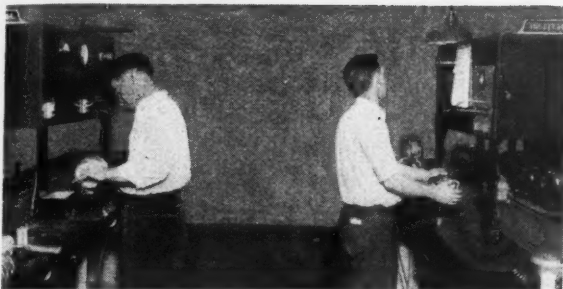


Fig. 8—Inspecting armatures and rotors. Defects in the windings—if any—are indicated by instruments in the faces of the cabinets.

supply to a given number of operators and maintain the established production rate to fit in with all other departments' production.

sulted from automotive gear research.

Returning to our machined castings for an instant, after leaving the machine shop, frame castings and end plates pass to the enameling department, Fig. 5, upon another unit conveyor where they are sprayed with a special high-gloss, non-cracking, non-chipping black enamel as they pass the operator and are never removed from the conveyor. Here, plainly, the speed of the conveyor sets the pace for production and whenever production requirements are such that the conveyor is too heavily loaded, additional operators are added to the spraying line.

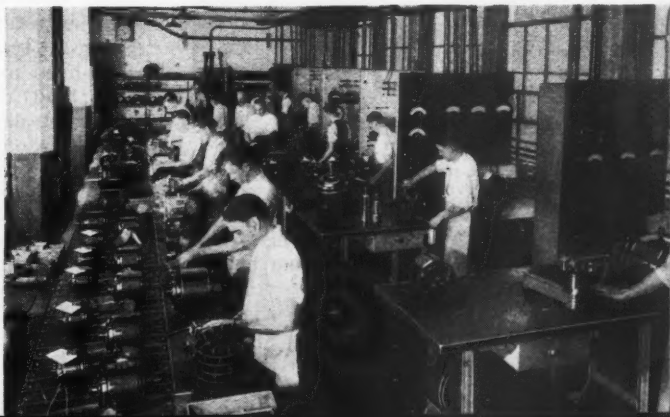
All stators and armatures are wound in the department shown in Fig. 6. Here the parts are carried along on a moving belt conveyor in the center of the work tables. As the parts move along, the operators remove them, replacing each with a finished piece. The speed of travel of these parts is set to furnish an exact

Figure 7 shows a close view of one of a series of armature-winding machines in which an armature for a  $\frac{1}{2}$  h.p. motor is in process of being wound. The operator places the armature in the holding fixture, attaches the wires, and starts the machine. When the correct number of revolutions have been made, the machine stops automatically, to be repositioned and to start and stop for as many positions as are necessary. The particular machine shown can wind armatures for five different sizes of motors.

All armatures and rotors are exactly balanced by specially designed dynamic balancing machines. This insures Master motors against vibration, one of the important features of a good motor.

After winding, armatures and rotors are inspected for electrical de-

Fig. 9—Here the motors are assembled complete, then are placed on the conveyor to be carried to the final inspection department. Connections in the conveyor provide for a running-in test while in transit.





fects and workmanship under the most stringent conditions. In this operation, the equipment shown in Fig. 8 is used. If there are any shorts or open circuits or grounded wires in the winding, such defects are indicated by instruments located on the faces of the cabinets shown. Each cabinet houses a complete set of test equipment with nothing exposed except the instrument dials. Thus both instruments and operators are protected carefully.

Both stators and armatures are thoroughly impregnated by the use of an automatic dipping and baking

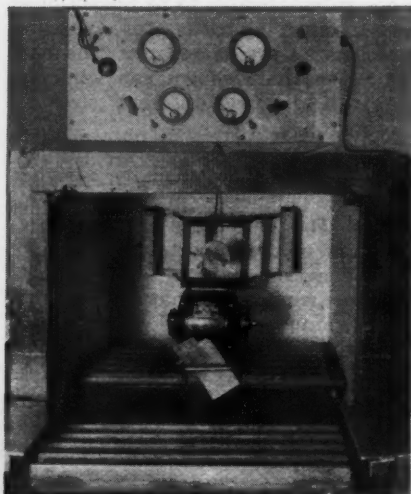


Fig. 10—The sound inspection booth. The noise of the running motor is amplified and registered on meters above the booth.

oven which achieves absolute uniformity, impossible to human action. This entire operation takes place on a unit conveyor without the slightest



Fig. 11—The motors are crated as they pass through the shipping room on their way to the loading platform.

possibility of variation in the high quality of the insulation. This is just another of the important requirements at Master, insulation being the life of any motor.

All the parts for each motor arrive at the motor assembly department. Fig. 9, at the same time, a feat of planning to be marveled at. Here each motor is assembled complete, then placed on the moving slat conveyor that carries it to the running test and inspection department. Plugged into connections in the moving table adapted for all standard currents, each motor undergoes a thorough run-in to give bearings and brushes a chance to wear in and to provide opportunity for the thorough construction tests for any possible defects.

Even after a motor passes this short run-in test, it is given a further running-in test of one hour (each geared-head motor operating under a brake load), during which it is checked at definite intervals for defects. One of the vital and most interesting tests which every Master Motor undergoes is the noise test in one of the sound booths shown in Fig. 10. These booths have been built as entirely sound-proof as possible and the extremely sensitive microphone

(Continued on page 43)

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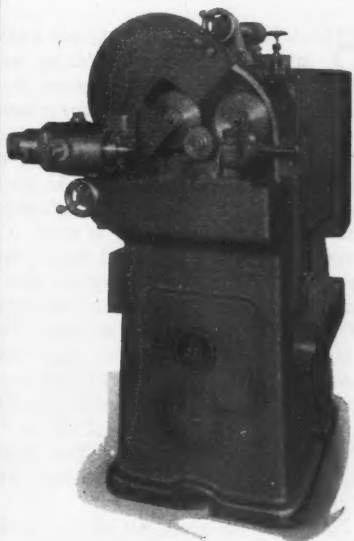
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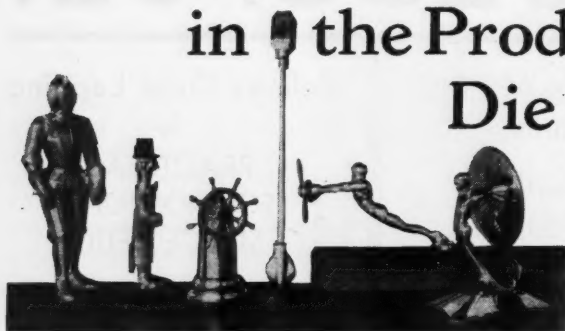
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# The Importance of Design in the Production of Die Castings



*By*

DONALD A. CLARK

**S**UCCESS in marketing die castings intended for decorative as well as for utility purposes depends in part upon the degree of artistry displayed in their design. To attain a wide sale, the article should have artistic merit and must have an appeal to the eye which will attract popular fancy. It must also be designed in such a way that it can be produced with reasonable economy, as otherwise the selling price may become prohibitive. That these two requirements are not incompatible is apparent from the following particulars concerning a group of zinc-base die castings designed and produced under the direction of Frank N. Mariani, Manager, Die Casting Division, E. A. Laboratories, Brooklyn, New York.

As will be seen, all of the items illustrated may be classed as novelties. All possess utility as well as artistic merit. Yet all are produced at a cost so low that large quantity production is or will be attained. One group is designed for sale through smokers' and novelty or gift shops, and the other through automobile supply houses or to automobile manufacturers.

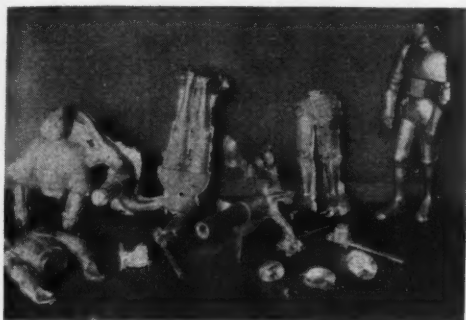
Perhaps the finest example in the group is the armored man, which is

cleverly designed to serve as a cigar lighter. It is an accurate reproduction of a museum suit of armor and is a remarkable example of the detail that can be brought out in die castings, as well as of what can be done in die casting construction when the production warrants a considerable investment in dies. In this case the section thicknesses vary from 0.025 in. up to  $\frac{1}{2}$  in. or more. All holes, both large and small, are cored and the whole design is such as to facilitate rapid assembly and to minimize the number of parts required.

Because of the shape of the figure, the parting line of the die could not be made in one plane, but had to be irregular. Much hand engraving was necessary also to produce the required detail. The dies represent a large investment, but as the number of lighters already sold has exceeded expectations, this investment has been amply justified.

As will be seen, almost the entire body, including both arms and legs, is cast in two pieces. The supplementary parts, including the visor-helmet, the bottom for the reservoir (which latter is hollow cored in the upper portion of the body) and the wick tube, are cast in a separate die. A tubular

extension of the upper body fits a mating recess in the lower body section and is held to it by a thumb-screw, the hole for which is cored.



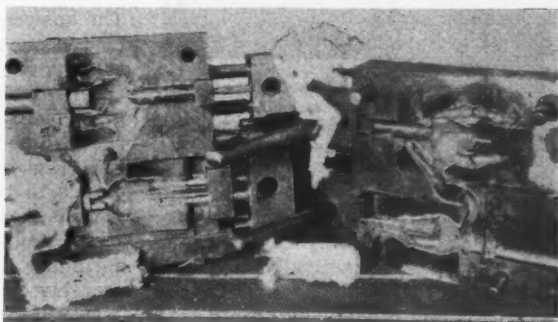
Group of unfinished and finished castings for the armored man, and the assembled unit. The two major castings are made in one mold, illustrated elsewhere, and the remaining small castings for the minor parts in a separate mold. Gating for both can be seen.

Since the core that forms the reservoir runs clear through the upper body section, the bottom of this recess must be closed. This is done with an elliptical flanged member having two cored holes that are afterward closed with screw plugs. This bottom is made a press fit and is sealed with cement.

The wick tube fits into the reservoir from the top and carries at its upper end an integral bracket which serves several purposes. It carries the pivot support for the flint wheels and for the visor. It also positions and supports the spring which holds the visor closed as well as the spring which causes the visor to fly open and strike a light when the first spring is depressed. Finally, it serves as the

seat for a screw which holds this assembly in place in the neck above the reservoir. All holes in this bracket are cored and the tube which is integral with it is cast in a true hollow cylinder without any longitudinal fin marks such as are usually found in tubular members, as the die parting is not in the axis of the tube but at right angles to it. Rivets which fasten the flat catch spring to the bracket are not separate pieces, but are lugs cast integral and headed over after the spring is in place.

A small stamping fastened to the visor carries the striking mechanism and has a short integral tube which snuffs out the flame of the lighter when the visor is closed. Thus all the mechanism of the lighter is assembled to the bracket at the top of the wick tube and the complete assembly is made before this tube is

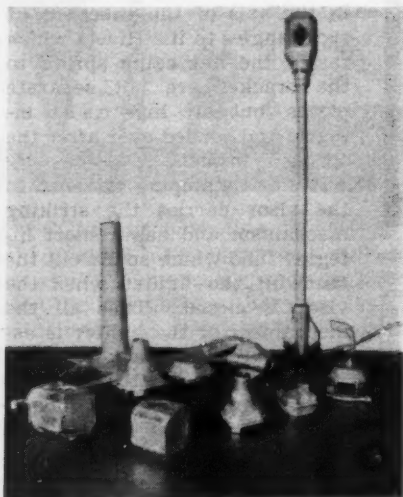


Die in which the major parts of the armored man are cast, and some of the castings as they come from the mold. Arrangement of the cones and the blocks for operating them is also shown.

attached to the reservoir neck. The only other assembly operations are those required in fastening the legs of the lower body section to the base. Legs are cast hollow up to about the knee, the solid portion above being

tapped to receive the fastening screws that pass through and are recessed into the black Bakelite base.

Aside from cutting off the fin which, of course, occurs around the irregular parting line of the die for the body portion, and of various sections of the smaller parts, practically the only ma-



Artistic fender lamp assembly and the die castings from which it is assembled. Except for cleaning fins and tapping holes, practically no machine work is required.

chine work is that necessary in tapping some of the holes referred to. Fins are cut off cleanly in dies made for the purpose. Practically no grinding is required and the casting die cavities are finished so smoothly that only a light polishing of the plain surfaces of the casting prior to plating is necessary. Uniformity in the castings is maintained by employing a high quality of Horse Head zinc alloy, termed "Zamak." Plating is done in chromium, cadmium, silver or bronze, depending upon the color and character of finish desired. Accompanying illustrations show finished parts and

assembly as well as the body mold and some of the castings as they come from the mold, with gate attached.

Another illustration shows some finished and unfinished parts and a complete assembly of an ornamental fender light which again is enhanced in value and sales appeal by unusual beauty and symmetry in design. The die in this case has no very unusual features, but the castings are good examples of products that are easily and quickly cleaned of fins and made ready for assembly with practically no machine work except for tapping of holes for screws. The tube which supports the lamp itself is not die-cast, of course, but is drawn, cut to length and pressed into fittings at each end.

Each of the diamond-shaped windows on three of the four sides of the lamp is fitted with a glass light which has to be held in place. As the glasses vary considerably in thickness, some means of fitting them closely so as to prevent rattle had to be devised. The answer to this problem was found by casting integral lugs near the bottom of the inner faces of the shell against which the glasses seat. These lugs overhang the glasses and the face which bears against the back of the glass is tapered or sloped in reference to this face so that, when the glass is forced home, it forms its own seat, bending the lug slightly or springing it so that it binds the glass securely.

Of the other articles shown in the illustrations, the helmsman's wheel cigar lighter is another example of good design, in this case with particular appeal to those having a nautical turn of mind. It is made from two principal die-castings, the wheel itself and its support, the latter containing the reservoir of the lighter. The mechanism is similar to that for the armored man, except that a different



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6—Double-row, self-aligning ball bearing; also furnished with adapter sleeve and nut.

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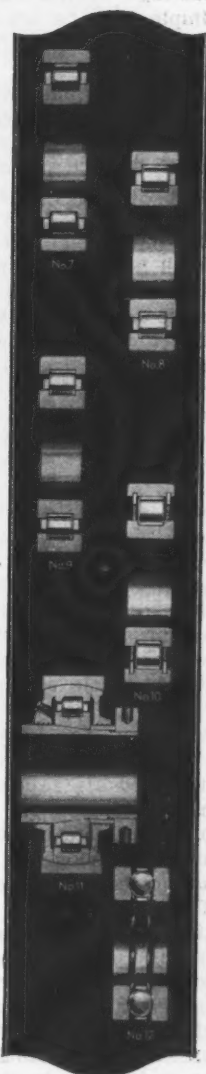
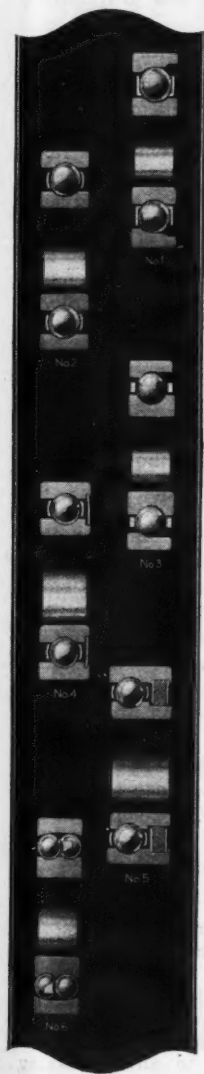
8—One-lipped cylindrical roller bearing.

9—Two-lipped cylindrical roller bearing.

10—Full type (retaining ring) cylindrical roller bearing.

11—Self-aligning adapter type cylindrical roller bearing with grease-retaining, dust- and moisture-excluding side plates.

12—Ball thrust bearing.



**NORMA-HOFFMANN BEARINGS CORP'N - Stamford, Conn., U. S. A.**

form of cap is employed over the lighter itself, and the lighter is operated by turning the wheel, which releases the catch, causing the cap to fly open and the flame to be struck. Castings in this case are relatively simple and the wheel fins are easily cut out in a single stroke of a trimming die.

The combination corkscrew and bottle opener depends for its appeal upon another type of art with a comic turn. Except for the hat, it is a one-piece casting having an integral base and is designed for plating all over. The recess for the corkscrew and the small hole for the pivot about which it swings are cored. A separate casting is used for the hat because this is dipped in black enamel to give it a pleasing contrast in finish. A cored recess in the head mates with a projection on the hat, the two being forced together with a press fit and without any machining. This operation, the riveting of the corkscrew pivot and the pasting of a felt cover onto the base are the only assembly operations required. Fins are trimmed quickly with suitable dies and very little polishing is required. Since all operations are so simple and so rapidly accomplished, the cost of the finished article is very low and the chances of its sale in large volume are accordingly increased.

Both of the remaining products illustrated are familiar types of automobile accessories. The radiator emblem, with its excellent simulation of an aircraft engine and propeller is assembled from three simple castings. The aviator's body and the rear section of the engine he holds are in one piece. Between this and the propeller, which with its cowling is a separate piece, is a crankcase-cylinder unit closely resembling the corresponding assembly of a radial engine. It is enameled in black while the other two

parts are plated. Again the die-castings are simple to make, to clean off fins, to finish, and to assemble. Consequently the finished article, though not lacking in artistry and eye appeal, can be made to sell in quantity at a low price.

Practically the same can be said of the ornamental mirror support with its base designed for mounting upon a tire. In this case the base and the figure are separate die castings fastened together with a single screw, which also fastens two metal straps, not shown. These straps pass through the openings provided in the base and are attached to a pair of light chains held together with a small padlock, intended to prevent theft of the ornament. A suitable socket for the ball supporting the mirror and permitting of its adjustment to the desired angle is formed integral with the figure.

It will thus be seen how a happy combination of the die-casting art with artistry of another kind has created a worth-while market that consumes many tons of castings annually. Although its volume is small as compared to that for purely mechanical parts, it is far from being insignificant and in some cases doubtless offers a wider margin for profit. In any case, it affords a good example of what can be accomplished when the engineer, the artist and the production man co-operate to achieve a pleasing and popular result.

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### Midget Motor Data Sheets

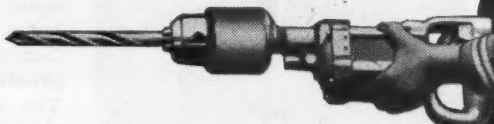
Barber-Colman Company, Rockford, Ill., manufacturer of the "Barcol Midget" shaded pole induction motors, announces that a descriptive bulletin and four data sheets on different types of these motors have recently been published and will be sent without charge to anyone asking for them.



# *Almond*

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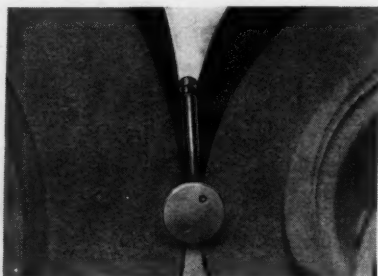
*J. R. Almond Mfg. Co.,*  
*Oshburnham, Mass.*

# Reducing Grinding Costs

By E. E. EVERETT AND W. E. SANDERS\*

THE recent satisfactory solution of a troublesome operating problem furnishes a prominent example of the need for careful, systematic study in the selection of materials, and illustrates very impressively the important economies which may thereby be effected.

The problem, which became acute about a year ago, involved the selection of a suitable material for centerless grinder support blades. These blades, which support automotive valves during a stem grinding operation, which, incidentally, takes place at a stem speed of 600 R.P.M., were wearing out so rapidly that it became essential that a material be obtained



has but a very short useful life in this service, and a number of special tool, die and high speed steels with but a single exception were of little greater usefulness. The best results obtained with these special steels, barring

the exception referred to, was 10,000 valves per blade dressing, while the common range was found to lie between 3,000 and 7,000 pieces per grind. Such blades, costing from \$5 to \$20 each, were therefore scrapped after 7 to 8 redressings.

The exceptional steel was used in the form of an insert partly as a precaution against cracking in this inherently brittle material, and also as an economy measure. Results were

not entirely satisfactory in either case, since premature scrapping as the result of a crooked valve fed by a careless operator was not uncommon. The performance of these blades, however, was 175,000 to 180,000 pieces per dressing, which is a very satisfactory figure

Composition, Heat-Treatment, Hardness

Type	Total Carbon	Silicon	Nickel	Chromium	B.H.N.	Heat Treatment
5-B	3.60-3.70	1.05-1.15	3.75-4.00	1.00-1.10	402-444	O.Q. 1420° F. Draw 300° F.
5-C	3.25-3.35	1.10-1.20	4.25-4.50	1.65-1.75	578-652	
						None

which would satisfactorily resist the combined abrasive action of the work and the emery used as the grinding medium.

The conventional chilled cast iron

in a material less fragile, and, if possible, less costly than the special steel.

The investigation eventually centered about a special type of hard alloyed cast iron known commercially under the generic trade name of "Ni-Hard." A material falling within the

\* Chief Metallurgist, Muncie Products Division, General Motors Corporation.

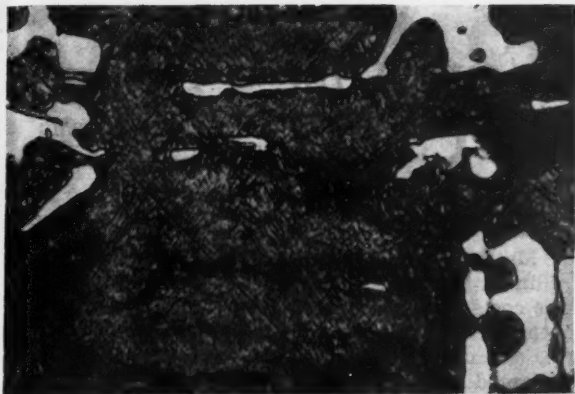
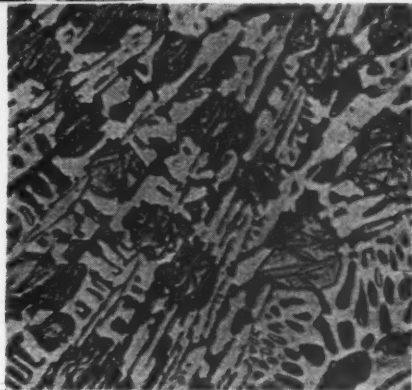


Fig. 1 (Above)—Type 5-B Cast Iron Etched Mag. x 500. This iron, containing 3.75-4.00 per cent nickel and 1.00-1.10 per cent chromium, is resolved by heat-treatment into a grey martensitic structure containing fine graphite and some free cementite. B.H.N. 402-444. Fig. 2 (Right)—Type 5-C Iron Etched Mag. x 500. A white iron structure containing massive cementite in a hardened-martensitic matrix is typical of this iron, "as cast," containing 4.25-4.50 per cent nickel and 1.65-1.75 per cent chromium. B.H.N. 578-652.



In Fig. 2 the structure of the 5-C blade will be seen to consist of the carbide structure typical of white iron contained within a martensitic matrix. This material, used as cast, has a hardness of 578-652 B.H.N. The high hardness is a reflection of the retention of the martensitic condition in the matrix, a

general specifications of "Ni-Hard" cast iron, and for which a suitable heat-treatment has been developed, has been found to combine the economic and practical features which a good grinder blade support should possess.

Two types of blades identified as 5-B and 5-C have therefore been adopted as standard, the analysis of which is shown. These blades, giving between 100,000 and 150,000 valves per dressing, with a life of 15-20 grinds, after machining and heat-treating, cost about \$2.50 each.

The structure of the 5-B blade, as shown in Fig. 1, after oil quenching from 1420 degrees F., and drawing at 300 degrees F., consists of a fine martensitic matrix containing free cementite combined with small amounts of fine graphite. After heat-treating, this material has a Brinell hardness value of 402-444.

condition which is brought about through the influence of the nickel and chromium.

The adoption of the 5-C type material for roughing operations, and the 5-B type for finishing, has eliminated in a large measure the annoyance and delay of replacing worn supports, while effecting an important ultimate economy in material costs.

*(Nickel Cast Iron News)*

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# ANNOUNCEMENT

## *Detroit Stamping Company acquires "short-run" license*

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### **Special Bulletins on Portable Hardness Testing Instruments**

The following bulletins on the line of portable hardness testing instruments that is being marketed by The R. Y. Ferner Co., Investment Bldg., Washington, D. C., can be had by addressing the firm mentioned. The bulletins should be requested by number.

Bulletin H-2 discusses the use of the Duroskop in the hardening of steel and the selection of stock to give a desired hardness after hardening.

Bulletin H-3 covers conversion curves for converting Duroskop readings to hardness numbers of the Brinell, Rockwell, and Schleroscope systems.

Bulletin H-4 is the current catalog on the Duroskop, Dwarf Brinell Press, and Triplex set of portable hardness testing instruments.

Bulletin H-5 tells of a special form of the Duroskop designed for the testing of wire, drill rod, needles, and other small cylindrical material.

Bulletin H-6 describes a Dwarf Brinell Press now available which is adapted to the testing of soft materials, using a

250-kg. load instead of 750 kg., with a 5 mm. ball.

Bulletin H-8 discusses the use of the Triplex Set for the testing of cast iron surfaces, such as lathe or planer beds or of engine blocks while in process of machining, to discover soft spots that necessitate rejection and thus save cost of useless machining.

Bulletin H-9 treats of the use of the Duroskop for testing the hardness and resiliency of plastic products, rubber, linoleum, fibre board, and so on.

Bulletin H-12 discusses the use of the Duroskop in checking the hardness of cylinders and rolls while in process of manufacture, to discover soft spots before carrying the machining needlessly far. The instrument can be used on the work while it is in the machine, and readings can be taken as rapidly as every two seconds.

Bulletin H-14 describes some tests made with the Duroskop on various samples of thin sheet metal—copper, zinc, and so on—and shows the degree to which different Duroskops agree, giving the average deviations of readings and the probable error of the mean and of a single reading.

## IDEAS FROM READERS

This department is a clearing house for ideas . . . If there is a "kink" or short cut in use in your shop, send in a description of it . . . We will pay for each one published.

### Milling Ports in Piston Valve Bushings

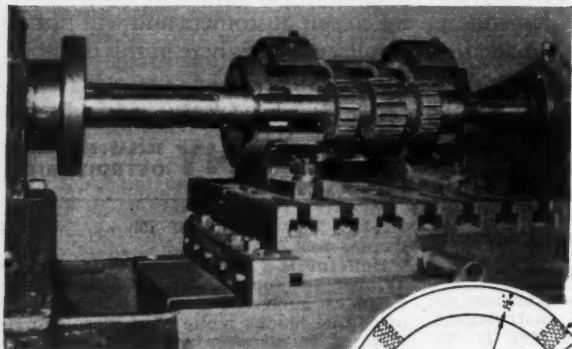
By H. H. HENSON

**O**NE question that has been discussed many times in locomotive shop practice is the question of the best way to machine the ports in

ple fixtures to hold the bushing, and an arbor for the cutters. It is important to use staggered-tooth cutters with teeth of either tungsten carbide or Stellite. The cutters are made to the size of the ports that are to be milled, and are spaced on the arbor to produce the required dimensions between ports.

The equipment is shown as set up on a horizontal boring machine, although it can also be used on a milling machine.

The bushing should first be bored to size and rough or finish turned, the latter be-

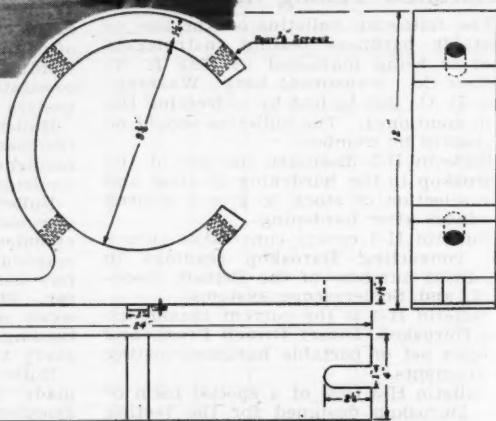


Above—Set-up for port-milling job.  
Right — Drawing of fixture for holding bushings.

a piston valve bushing, accuracy and time considered. The method described here, however, is the most efficient and shortest that the writer has ever seen used, as the use of this equipment makes it possible to complete the operation in approximately 15 minutes after the job has been set up.

The equipment consists of two sim-

ing necessary so that the bushing will slip easily into the fixture. The bushing is lifted with the aid of a hoist





and when at the proper height, is pushed into the fixture from one end. The inside dimension of the fixture should be approximately  $\frac{1}{4}$  inch larger than the outside diameter of the bushing that is to go into it. For example, the fixture indicated by the drawing is for use in machining the ports of a bushing that is 8 in. diameter inside and  $9\frac{1}{2}$  in. diameter over the outside. As can be seen by reference to the photograph, with the proper number of cutters, three or four ports can be milled simultaneously.

## Device for Making Enlarged Drawings

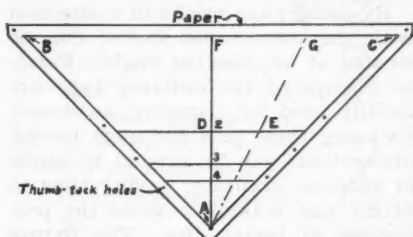
By MORRIS A. HALL

**O**CCASIONALLY it becomes necessary to redraw undimensioned parts of a drawing to a larger or smaller scale than the original drawing. This task is not easy unless one has some method by which the ratio of enlargement or reduction can be transferred. The writer uses the device shown in the illustration, which does very nicely.

The device is made from a large triangular piece of celluloid of fair thickness, upon which is inscribed an isosceles triangle with the long side or base parallel to the long side of the piece of celluloid, as shown in the drawing. An altitude line A - F is drawn, then the cross lines 2, 3, and 4 are drawn parallel to the base a distance above the vertex equal to half, one-third, and one-fourth the altitude.

On the  $\frac{3}{8}$ -in. border of the long side, outside the base line B - C, attach a piece of paper by means of thumb tacks. Provide a pin hole at the vertex A and thumb tack holes along the sides. If a drawing is to be enlarged to twice the original size,

center it on line 2 passing through D. Any length of line on the line D - E will be found doubled on the base line F - G. When a drawing is to be



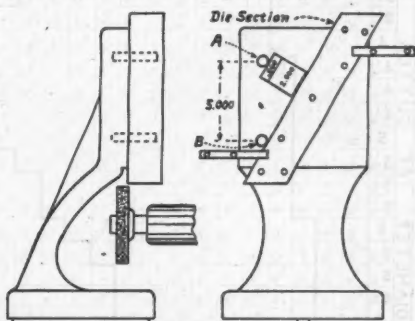
Device for enlarging or reducing drawings.

reduced, the line B - C is placed on it and the reduced dimensions will be found on line 2, if for one-half reduction, line 3 for one-third, and line 4 for one-fourth. The paper is for transferring measurements, and is not an absolute necessity.

## Grinding Angles on Dies

By F. J. WILHELM

**T**HE fixture shown in the illustrations is quite similar to the usual fixtures used for grinding the ends



Surface grinding fixture with pins for locating for end and angle grinding.

of die sections that are too long to pass under the wheel of a surface grinder. There is a difference, however, the difference consisting in that



the usual tongue is replaced by two pins A and B, which are located at one side in the face of the fixture, as shown.

By using gage blocks in connection with the pins, a die section can be located at any desired angle. Parallel clamps of the ordinary type are usually used for clamping, as shown. By using these pins and gage blocks, die sections can be ground to limits of extreme accuracy, saving time in fitting and making possible the production of better dies. The fixture can also be used for square end grinding by clamping the work in alignment with the pins.

The fixture is of cast iron, with a tongue on the base. The base is machined first, then the fixture is bolted in place on the machine and the face

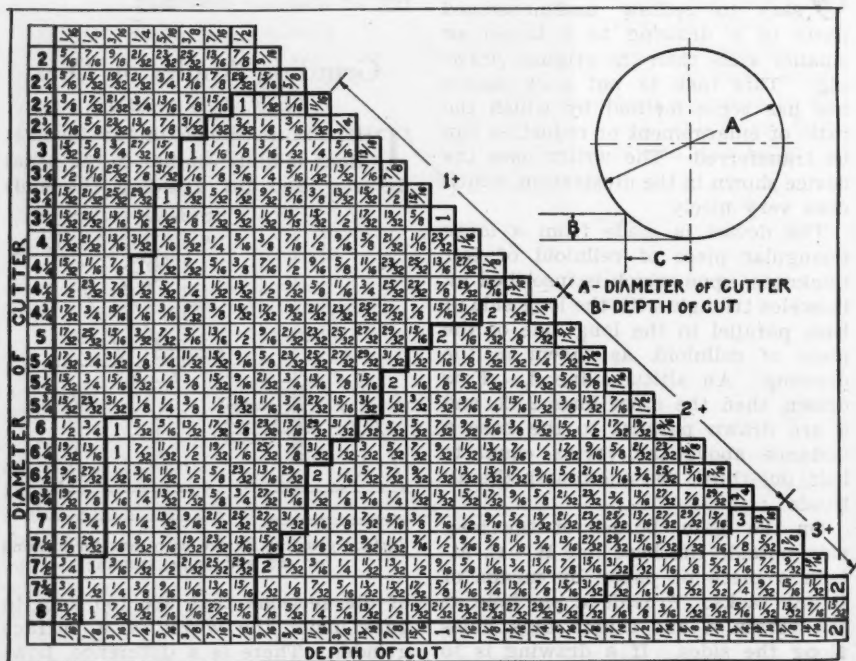
is ground square with the base, after which the pins are put in. This tool is a valuable piece of equipment for any tool room.

## Table for Computing Approach of Milling Cutters

By E. W. DICKETT

**O**CCASIONALLY it becomes necessary to ascertain the amount of approach that is necessary to mill into the work a given depth with a cutter of a certain specified size. This approach may be calculated, or it may be obtained by scaling a layout, or the distance may readily be found by referring to the chart shown herewith.

As an example: an 8-in. diameter cutter is to be used to mill a 1-in.





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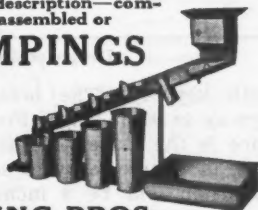
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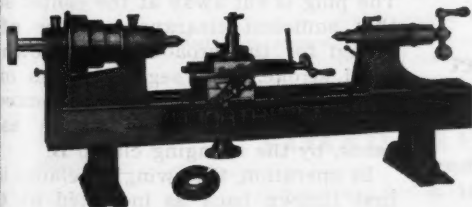
Quantity  
Production  
or  
Sample  
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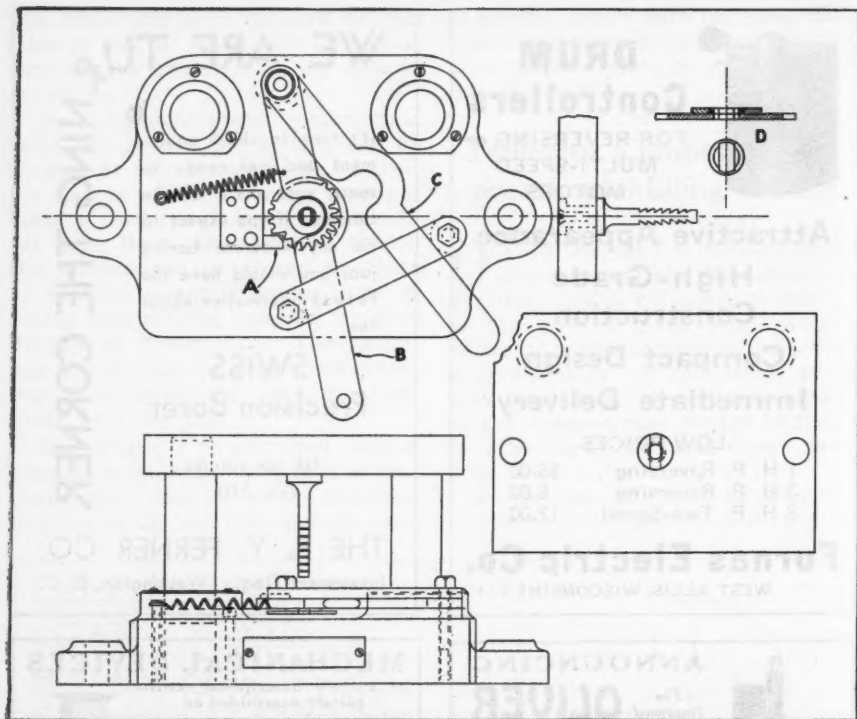
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Design of die used to broach keyway in sheet metal hub.

depth keyway. The bottom of the keyway is 9 in. long. For what distance is the cutter actually cutting? It is, of course, easy to see that the dimension will be 9 inches plus the approach. In this instance the chart indicates that the approach will be approximately  $2 \frac{21}{32}$  in. Therefore the necessary amount of cutter travel, or feed, will be 9 in. plus  $2 \frac{21}{32}$  in., or  $11 \frac{21}{32}$  inches.

## Broaching Die for a Sheet Metal Hub

By JOHN MCCULLAGH

**I**N the construction of a small sheet metal assembly, consisting of a segment and hub, it was necessary to

machine a keyway at opposite sides of the hole as shown in the drawing. Production requirements and the necessity for low cost dictated that the job should be done in a punch press; accordingly, the die shown in the illustration was designed and has worked out successfully in operation.

The segment is located in the die by the center plug and the finger A. The plug is cut away at the center so that sufficient clearance will be afforded for the broach on its downward stroke. The segment rests on a hardened block and is prevented from raising, when the broach ascends, by the swinging clamp B.

In operation, the swinging clamp is first thrown back as indicated at C

(Continued on page 45)

## New Books

**TIME AND MOTION STUDY.** By Stewart M. Lowry, Harold B. Maynard, and G. J. Stegemerten. 471 pages, 6 x 9 inches, with 82 illustrations and a number of charts and tables. Published by McGraw-Hill Book Company, Inc., New York, N. Y. Price, \$5.00.

In the 41 chapters which this book contains, the authors have started with a discussion of the economic necessity for measurement of labor and have carried the reader progressively through an outline of the aims and development of time study, with a chapter on the qualifications of a good time study man, to the actual business of making the study, recording the notes, and translating them into terms of the existing system of wage payment.

The authors differentiate between time study and motion study, and explain each. The reader is told how, by means of motion study, the job is analyzed and standardized, then he is instructed in the actual routine of making a time study. The equipment required for time study work is described in detail. The subject of allowances is covered, and in-

structions are given for arriving at the correct allowed or standard time. The different wage payment plans are explained, and a chapter is included on the group system of wage payment.

The book is designed to fulfill the dual purpose of serving as a textbook for technical schools and as a handbook for practical men and factory executives. The factory owner or executive who is planning the installation of a wage incentive system will find in this volume practically all that it is necessary to know, short of practical experience.

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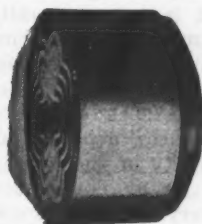
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## Over the Editor's Desk

### *The Mental Attitude*

**T**HAT a correct mental attitude is more important to success than "book-learning" was affirmed by A. W. Robertson, Chairman of the Board of the Westinghouse Electric and Manufacturing Company, recently, in an address to the students of Allegheny College. Mr. Robertson said: "It is now generally accepted that human beings are the most important part of any business. Employees are the first consideration of every business. The success or failure of a business depends, after all, on the quality of the human brains running it. Why do some companies meet every competitive condition with success while others fail? The answer lies in the brains and mental attitude of the organization.

"If you would make a living in this dizzy world of ours, it is more important that you have a right attitude of mind than it is that you have knowledge. The right point of view makes all things possible. The wrong point of view makes all things impossible. We are told by some that we are slaves. If being a slave means doing only what we have to do, then most of us are in truth slaves, but he who does more than he is required to do becomes at once free. He is his own master. How often do we hear it said: 'It was not my work.' Too often we fix our minds almost entirely upon what we are going to get and give no thought at all to what we are going to give in return.

"Our interpretation of the careers of conspicuous human beings in this world often leads us to the erroneous conception that, if they are well to do, as most of them become, their minds have been set upon acquiring wealth. To most worthwhile people, whatever wealth they have come as a

mere incident to the service which they have rendered to the world."

Not only the Allegheny College students, but all other students—whatever their age and position—will recognize the worth of Mr. Robertson's statement.

### *Elections and Economics*

**T**HE decisive victory of one of the major political parties in the recent election indicated that the people of this country are practically of one mind, and that alone should be of immense help to the business situation. They got what they wanted, and their confidence in the future has largely been restored. Buying has received an impetus which will gradually be felt by the manufacturers of merchandise and eventually by the builders of tools and equipment.

The business curve took an upward swing some time before the national election and it is still progressing, which proves the truth of Roger Babson's statement that "Presidents do not make fundamental conditions; rather, fundamental conditions make presidents." The fact is that in no case where conditions were improving at national election time has the election had any retarding effect.

### *Progress*

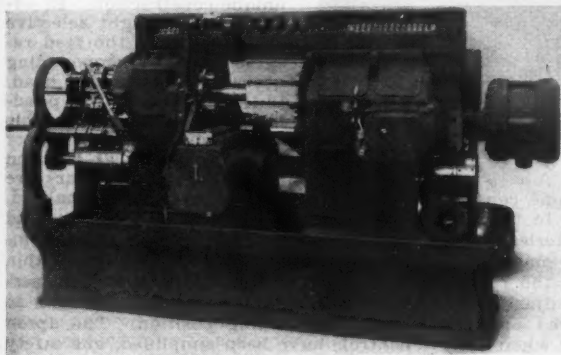
**I**T is interesting to note that the first seasonal meeting of the Foremen's Club of Dayton, Ohio, had an attendance of 963 people. It is true that the club draws for its membership from all the industries in the vicinity, but membership in the club is not compulsory, which makes it all the more evident that the members attend because the meetings are interesting and helpful. There should be a suggestion in this for those who can make use of it.



## NEW SHOP EQUIPMENT

### Model "R" Gridley Automatic Screw Machine

The distinctive advantages of design and construction that have proved so successful in the larger sizes of Gridley automatics, made by The National Acme Company, Cleveland, Ohio, have now been incorporated in a  $\frac{7}{8}$ -in. size, to be



Model "R" Gridley Automatic Screw Machine

known as the Model "R." The machine has four spindles which run at the higher spindle speeds needed for smaller diameters, and is equipped with a fast, shockless indexing mechanism that reduces idle time to a minimum.

In order to provide the maximum of rigidity, the frame and pan are of box form with a heavy top section to tie the gear section to the spindle frame. The pan is cast in one piece, heavily ribbed, and the oil guards are on rollers so that they may easily be moved. The chip space is large and is designed so that a chip conveyor may be installed.

The width of the spindle carrier bearings has been increased and the carrier has been lengthened, increasing the center distance of the spindle bearings and affording better support for heavy cuts. The length of the spindles, collet, and feed tubes has been accordingly increased. To insure accurate alignment,

the stem of the spindle carrier is made integral with the spindle carrier and is ground in the same setting as the support bearing surfaces. Thus the main tool slide, which is mounted on this stem, is in permanent alignment with the spindles.

High spindle speeds are provided, not only so that the fullest possibilities of modern cutting tools may be realized, but also to permit the working of stock of much smaller diameter than the rated capacity of the machine. Draw back collets are used.

The design of the main tool slide and the four cross slides is such that the tooling is always readily accessible. A complete force-feed lubricating system provides oil automatically to all bearings and working parts. Cutting oil is pumped by a direct-connected pump on the rear of the machine to the flexible steel tubes that supply the individual cutting tools.

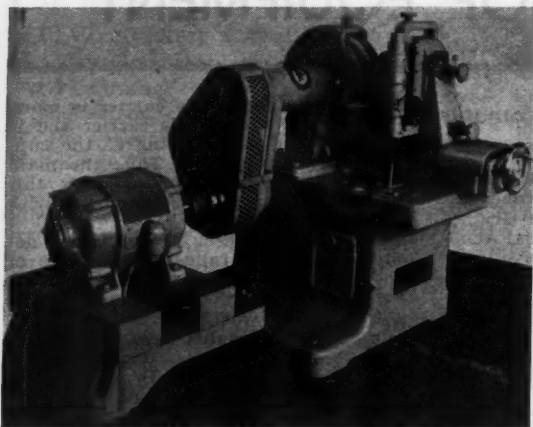
The range of spindle speeds is from 272 to 2,579 r.p.m., and the maximum length of stock feed or turning feed is 5 in. Floor space required, including stock stand, is 15 ft. 4 in. by 2 ft. 7 in. Net weight, motor drive, 6,300 lb. Standard motor equipment consists of a  $7\frac{1}{2}$  h.p., 1,800 r.p.m. motor, direct drive to drive shaft. The Chronolog, described in the October issue of MODERN MACHINE SHOP, is supplied as standard equipment on this machine.

### Production Type 101 Centerless Polishing Machine

Cylindrical work can now be polished accurately, quickly, and at low cost by the use of the Type 101 Centerless Feed Polishing Machine shown in the illustration. The machine has been developed by the Production Machine Company,

Greenfield, Mass., and consists of a high power centerless feed unit combined with a high speed polishing wheel.

47 x 38 in. Weight, for motor, 1,400 lbs.; for belt, 1,200 lbs. Capacity of the machine, up to 6 inches diameter.



Production Type 101 Centerless Feed Polishing Machine

The operation of the machine consists simply in feeding the work to the machine. The automatic centerless feed carries the work through the machine at the feed required to obtain the results desired. The feed can be adjusted according to the finish required and the condition of the stock, and when once set, produces duplicate work with the same finish and in the same length of time. Thus the necessity for skilled operators is eliminated.

Any type of polishing or buffing wheel may be used, to produce any desired grade of finish from roughing to the finest kind of buffing. Wheels from 10 in. to 16 in. in diameter and with 4-in. face may be used. The wheel spindle is 1½ in. diameter, and is mounted in Timken anti-friction bearings. Alemite forced lubrication is provided to all spindles. Power is transmitted through Dodge V-type triple belt drives. Complete protection to the operator is afforded through hoods and guards.

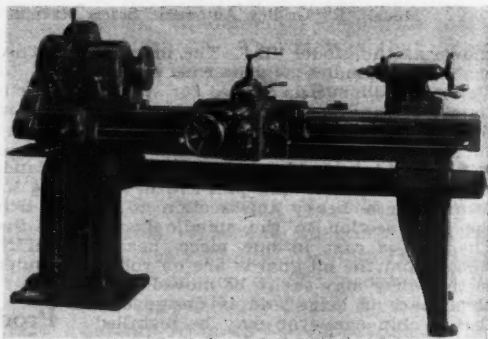
Motors from 7½ to 10 h.p. can be used, or the machine can be equipped for belt drive. For motor drive, the floor space required is 47 x 56 in. For belt drive,

## LeBlond Super-Regal Engine Lathe

The illustration shows the "Super-Regal" engine lathe that has been placed on the market by The R. K. LeBlond Machine Tool Co., Regal Division, Cincinnati, Ohio. The machine is said to have a number of new features for safe and simple control, and for automatic lubrication.

The headstock is of unique construction. In addition to the eight selective speed changes, the feed reverse and feed compounding gears are inside the head, thus eliminating the possibility of noise and trouble and eliminating the use of swinging plates at the end of the lathe. All gears are of steel, heat treated and normalized.

All controls are centralized; the feed box, speed changes, feed reverse, compound, and motor control are within easy reach of the left hand of the operator, making it unnecessary for him to leave his working position. The apron controls have been simplified, one safety



LeBlond "Super-Regal" Engine Lathe

interlocked trip lever controlling both carriage cross slide movements.

The "one shot" system of lubrication is used, providing positive lubrication



and reducing the time required for oiling. The apron is a double-walled one-piece casting in which all moving parts run in oil, the rack pinion and hand wheel rolling on ball bearings. A plunger pump in the apron reservoir lubricates the carriage and cross slide ways and the cross feed screw bearings.

The motor is mounted on a hinged plate on the rear of the leg, in which position it is high enough to be free of floor dust and eliminate any tendency to headstock vibration. Power is transmitted through noiseless vee belts. The machine is built in 12-in. and 14-in. sizes, with any bed length required.

### Gorton No. 9-J Vertical Milling Machine

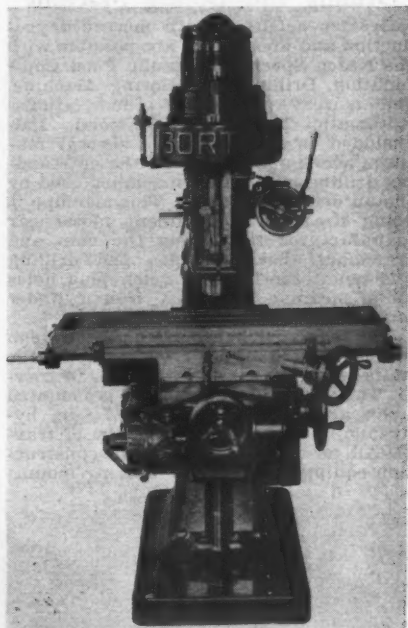
A new vertical milling machine has been added to the line of high speed profiling, die-cutting, engraving and milling machines manufactured by the George Gorton Machine Co., Racine, Wisconsin. This new machine is known as the No. 9-J Vertical. It is a size larger than the 8-D Vertical, and has several improvements in addition to the new features which were first introduced in the 8-D.

The 9-J Vertical is a precision machine specially designed to run small cutters at high speeds on tool, die and mould work, as well as general manufacturing and production within its capacity. The 9-J runs to the limit high speed steel cutters from  $\frac{1}{4}$  in. to 2 in. diameter. It has a very rigid, accurate spindle, capable of the extreme speeds required for maximum results with the new carbide cutting alloys. The machine will handle economically small work requiring a fast, sensitive machine, and also take heavy cuts at feeds and speeds comparable to those obtained on modern No. 1 or 2 vertical milling machines.

One of the principal features of design is the sliding head, which carries spindle and drive complete, and which can be quickly adjusted in or out by means of a rack and pinion, thereby doubling the area covered at one setting of work. Another feature is the buyer's option of power or hand feed to the table. The motor and gear box for table feed are compactly assembled within the knee, and a power feed knee can be furnished or a plain knee substituted, without affecting other parts of the machine. Feeds from 4/10 in. to 30 in. per min. are obtainable with the power feed knee.

A wide spindle speed range is provided; 20 speeds from 250 to 4,000 r.p.m. being obtained without back gears or extra pulleys. The spindle is mounted on large precision ball bearings, and has a No. 10 B & S taper hole. Quick-action lever or micrometer dial feed are supplied.

The drive is thru an endless V-belt from a 2 h.p. vertical motor. The ma-



Gorton No. 9-J Vertical Milling Machine

chine is equipped with a spindle pulley brake for stopping the spindle quickly at any speed. A positive micrometer depth stop graduated in thousandths, which also permits the use of thickness gauge blocks, is applied to the spindle.

All feed screws have large micrometer dials, vital parts are hardened and ground alloy steel, pulleys are shielded and ways are covered. One wick-feed oiler lubricates the entire spindle and drive assembly. The table feed gear box has automatic lubrication. All other points are lubricated with Alemite pressure gun. A coolant tank is cast in the base and coolant pump and piping is furnished when desired.

The table longitudinal feed is 24 in.

Cross feed, 12 in. Sliding head movement in and out, 14 in., making a combined cross feed of table and sliding head of 26 in. Vertical feed of knee, 14 in. Vertical feed of cutter spindle, 3½ in. Height of machine overall, 81 in. Weight, 2,900 pounds.

### **Natco Special Hydraulic Feed Drilling and Boring Machine**

Greater accuracy with increased production and lower costs are possible with the Natco Special Hydraulic Feed Combination Drilling and Boring Machine, the newest product of the National Automatic Tool Co., Richmond, Ind. Included in its design are several features which make it one of the outstanding drilling and boring machines used by the automobile industry. This machine is being used by a prominent motor car manufacturer for boring the cam and crankshaft bearing holes and drilling and counterboring the welch plug holes of a medium-sized cast iron cylinder block.

The two front heads are mounted upon special Natco type C 6-in. hydraulic units, each arranged with 24-in. of travel. The rear right hand head is mounted upon a special Natco type C 8-in. hydraulic unit arranged with 42-in. of travel. All heads are of type "D" construction equipped with roller bearing mount-

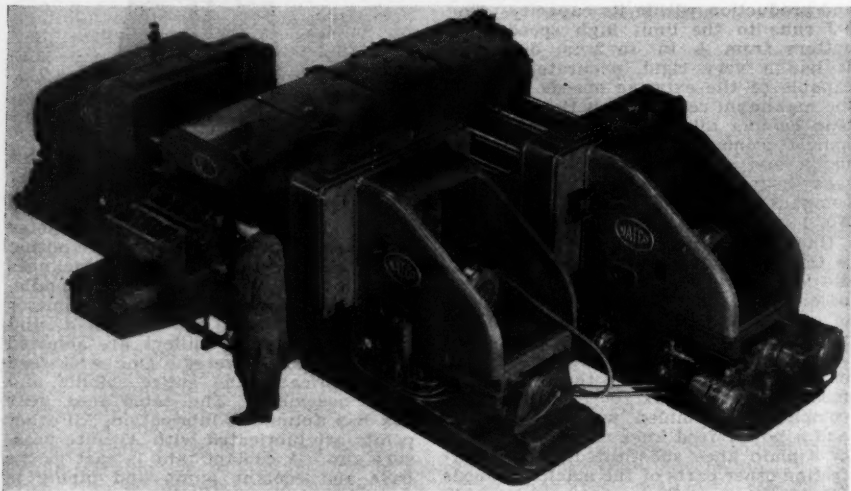
ed spindles arranged with nose adjustment.

The three large units are mounted against and bolted to a large welded steel pedestal upon which is mounted a four-position automatic conveyor type fixture, arranged to hold two cylinder blocks in each position. The fixture is operated by hydraulic pressure and is interlocked electrically to the heads to insure that all blocks are in their correct position before the heads begin their various operations.

While the heads are completing their cycles, the conveyor returns to the loading position, the operator again loads two cylinder blocks, and the machine is again ready for another cycle. Complete control of the machine is accomplished thru the use of one push button station by the operator. Approximate production is 75 cylinder blocks per hour.

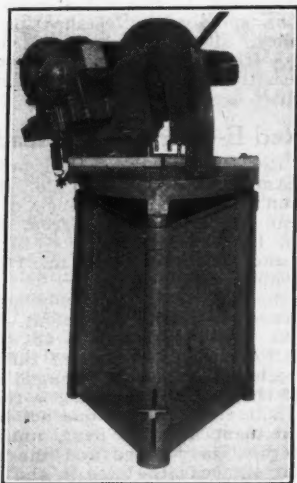
### **Tannewitz Swivel-Table High Speed Abrasive Cut-Off Machine**

The cutting of tubing, metal moulding, and small bars can be accomplished smoothly, quickly, and with practically no burring by the use of the High Speed Abrasive Cut-Off Machine shown in the illustration. This machine, which is a product of The Tannewitz Works, Grand



**Natco Special Hydraulic Feed Drilling and Boring Machine.**

Rapids, Michigan, is made in two sizes. The smaller size is made for use with a  $7\frac{1}{2}$  h.p. motor; the larger size is intended to be driven by a 15 h.p. motor.



**Tannewitz Swivel-Table High Speed Abrasive Cut-Off Machine**

With a spindle that runs at a speed of 5,500 r.p.m., the cutting is done with an abrasive wheel that cuts through metal stock practically instantaneously and without leaving a burr. Circular saws may, however, be used with this machine for cutting through non-ferrous metals.

The principal feature of the machine is that the circular table, upon which the motor and saw yoke are mounted, swivels from 45 deg. left to 45 deg. right, making it unnecessary to swing the stock around in order to cut angles. In consequence, less floor space is required. The machine is provided with hold-downs on both sides of the work, treadle-operated. The cutter is depressed by means of the hand lever. The drive is through a multiple V-belt, from a ball bearing motor.

### Delta Floor-Type Drill Press

The Delta Manufacturing Company, 3777 North Holton Street, Milwaukee, Wis., has brought out a floor-type single-spindle drill press that is said to be accurate enough for use not only in precision drilling, but also as a router, mor-

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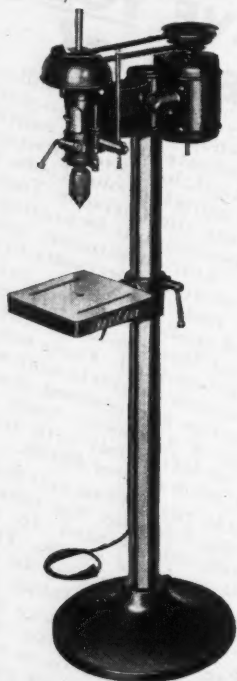
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tiser, or shaper on pattern work. The machine is 68 in. high over all, has a table travel of 43 in., and a spindle travel of 4 in. The standard chuck has a capacity of 17/32 in. and the machine



Delta Floor-Type Drill Press

drills to the center of a 14-in. circle.

Provision is made for four speeds of 590, 1,275, 2,450, and 5,000 r.p.m., which are A.S.M.E. standard speeds for high speed drills from 1/8 to 1/2 in. Provision is also made for speed of 8,000 r.p.m. for routing and shaping. The quill is graduated, and is fitted with an adjustable pointer and depth gage stops for automatic depth-gaging.

A unique feature of the machine is the interchangeability of spindles. In addition to the regular spindle, carrying the maker's own chuck, spindles for Jacobs chucks are available, together with spindles for production work with No. 1 and 2 Morse taper holes, also spindles with bore for standard wood-working bits and a spindle for formed cutters. A mortising attachment is also available, which transforms the machine

into a regular vertical mortiser. The head is reversible for shaping work.

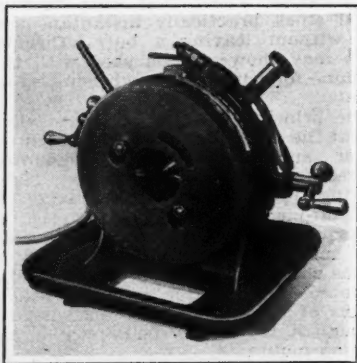
The spindle bearings in the quill are of the high speed precision type, self-sealed, and a similar bearing, over 2 in. in diameter, carries the spindle pulley. The spindle is "free-floating" in the pulley, all of the belt pull being taken by the pulley bearing, insuring free, sensitive operation of the spindle.

### "Red-E-Quick" Die Head

The "Red-E-Quick" Die Head, product of the American Die & Tool Co., Reading, Penn., requires but two sets of dies to thread all sizes of pipe from 1/2 in. to 2 in. inclusive; one for 1/2 in. and 3/4 in., and the other for 1 in., 1 1/4 in., 1 1/2 in., and 2 in.

The die-controlling cam-ring carries an accurately-notched segment, each notch in which corresponds to and is marked for a given setting of the dies. The notched segment is engaged by a pawl so that, as the cam-ring is rotated under it, it engages first one notch and then the next and the next, until the correct pawl is reached and the pawl, engaging it, locks the dies in the exact positions required to produce the size of the thread. Convenient means are also provided for necessary adjustments.

When a standard length thread is to be cut, a spring plunger is depressed before the dies are set. Then, when the



"Red-E-Quick" Die Head

full length thread has been cut, the plunger trips the pawl, the dies open and the pipe is free to be removed from the machine without any "backing-off."

What may be done with this equip-

ment may be appreciated from the fact that one piece each of 1 in.,  $1\frac{1}{4}$  in.,  $1\frac{1}{2}$  in., and 2 in. pipe may easily be threaded, chamfered, reamed, and cut off in less than seven minutes, floor-to-floor time, all operations included.

### Societe Genevoise Model MP-2C Precision Layout and Boring Machine

The line of Societe Genevoise jig boring machines handled in this country through The R. Y. Ferner Co., Investment Bldg., Washington, D. C., has been augmented by the addition of a precision machine in the design of which several novel features have been incorporated.

The machine, designated as the Model MP-2C, serves first of all as an accurate layout machine with facilities for drilling and boring holes, and as such will be of special use in the development of new products in which the parts are to be interchangeable. The machine can be used in the construction of the first models, and also for the first series of parts if it is desired to produce a small number of units before tooling up. It can later be used to tool up for production manufacturing, in the making of jigs, fixtures, punch and die plates, master plates, and die casting or bakelite molds.

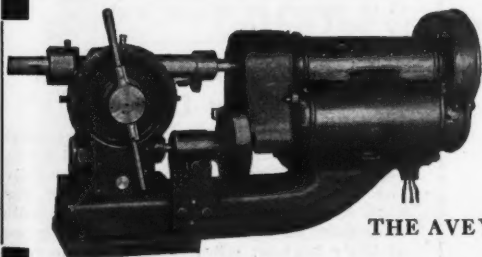
The capacity of the machine — for pieces approximately 10 x 15 in.—adapts it especially for the lighter class of work. In addition to its value as a precision borer for the production of parts and tools, it affords what has not heretofore been available in the field of metrology—a means of making measurements in all three co-ordinates with practically equal facility and accuracy, besides providing, in the use of a cir-



Societe Genevoise Model MP-2C Precision  
Layout and Boring Machine.

cular table, for measurements in polar co-ordinates.

The machine has a pedestal-type bed, which supports a work table and a single vertical column, the latter carrying the motor, gear box, boring head, and devices for making vertical measurements. The work table has a working area of  $10\frac{3}{4}$  x 18 in. Instead of resting



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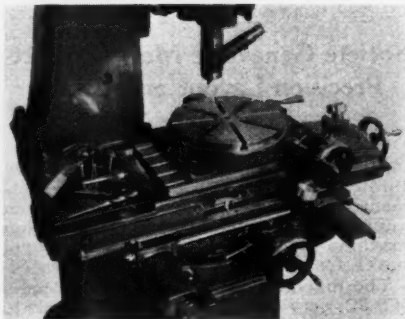
on a cross table as usual, the table rests on flat ways directly on the bed of the machine. It is, however, free to move in both horizontal co-ordinates.

Partially surrounding the work-table slide is a second slide or guiding frame which has similar flat ways resting across the ways of the bed, to which they can be clamped by a self-adjusting clamp. The work-table slide can similarly be clamped to this guiding frame, and is kept at right angles to the ways of the bed by the alignment with the guiding frame.

Two measuring lead screws are provided; one for controlling the movement of the guiding frame and the work table on the bed and the other to control the movement of the table longitudinally with reference to the guiding frame. Each screw is fitted with a micrometer head reading to 0.00005 in., with a tangent screw for making final settings. Settings of the table are guaranteed accurate within 0.00015 inch. The range of movement of the work table across the ways of the machine is 12 in., and the possible movement at right angles is 8 inches.

The ability to move the table in two directions makes it unnecessary to pro-

vide for movement of the boring head on a horizontal slide; thus the difficulties of a dovetailed slide are avoided. However, the carriage that supports the boring head on the column can be moved



The work table rests directly on the bed of the machine, but is moveable in both directions.

vertically  $9\frac{1}{2}$  in., by means of a hand wheel that operates a pinion in a rack.

The spindle is driven direct from a half h.p. motor at the opposite end of the carriage through a gear box which provides six speeds; 190, 375, 590, 1160, 1535, and 3000 r.p.m. The motor and driving shafts are dynamically balanced to avoid any vibration, and the gears are ground for accuracy and silence. The spindle has a total feed of 4 in., and may be operated under a power feed of 0.004 in. per revolution or by hand feed. Holes can be drilled as small as No. 57 drill, or bored to a diameter of 1.6 inches. A graduated rod, in connection with a dial indicator, will provide for vertical adjustments to 0.001 in., and readings to 0.0001 in. can be obtained by the use of a Jo block.

The machine, without circular table, weighs 1550 lb. net, and occupies a space 45 in. square by  $64\frac{1}{2}$  in. high.

### Motorized Bullard Vertical Turret Lathe

By completely motorizing the vertical turret lathes made by The Bullard Company, Bridgeport, Conn., this company has fitted its product primarily for high speed work. Metalloid cutting tools may now be operated in these machines at their highest efficiencies. In the case of the 42-in. machine, it is possible to



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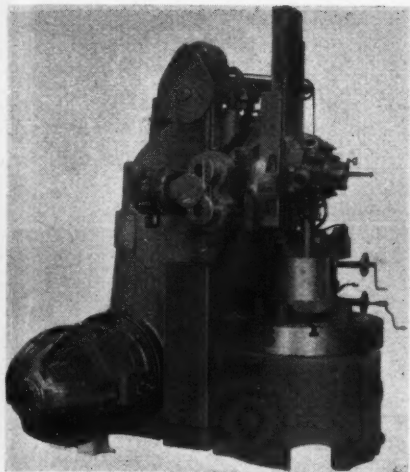
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Completely Motorized Bullard Vertical Turret Lathe.

obtain table speeds ranging from 4.1 to 150 r.p.m.

The illustration shows a Bullard vertical turret lathe with flange-mounted motor, also the method of application of the power traverse and rail-raising motors. The main drive motor may be either a constant horse power adjustable speed motor or a constant horse power multi-speed a.c. motor with automatic control. To facilitate operation, the power traverse, rail-raising mechanism, and cutting lubricant system are each individually motorized. In addition, the lubrication system, by means of its own motor drive, provides pressure lubrication of clean filtered oil to the

spindle bearings. The lubricating pump motor is interconnected to the main drive control so that if for any reason the pump motor should cease to function, the main drive motor is automatically cut off the line.

All motors are of the ball bearing type, and the main drive motor may be connected in one of three ways to meet the customer's preference. The first method is flange mounting with motor bolted to the side of the bed. The second is direct-coupled with motor floor-mounted, while the third is by drive through chain or V-belt with motor floor-mounted or bracket-mounted to the rear of the machine.

### Cincinnati Lathes Equipped To Machine Pistons

The three illustrations show the equipment and set-up for three operations in the machining of automobile pistons, as performed in Cincinnati lathes, product of The Cincinnati Lathe & Tool Co., 3209 Disney Street, Cincinnati, Ohio. With this equipment pistons can be ma-

### CULLMAN SPROCKETS

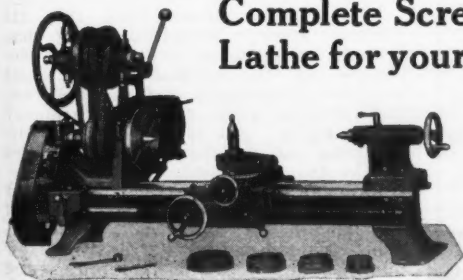


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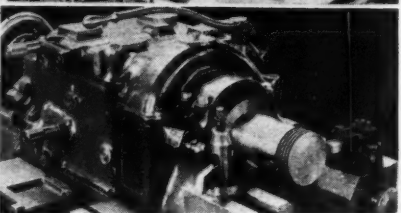
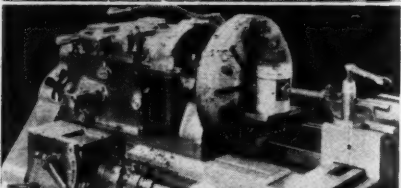
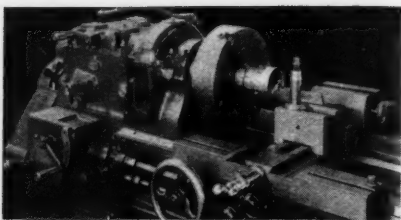
**ATLAS PRESS CO.**

1846 N. Pitcher St. Kalamazoo, Mich.

chined in less than four minutes each. It is said that this time can be reduced at least one-third by the use of tungsten carbide tools, and further reductions can be effected by the use of an air chuck on the first operation and manipulating the draw-in attachment by air on the last operation.

Most of the operations were performed at a cutting speed of 310 ft. per min. and 0.008 in. feed, using high speed steel for all excepting the grooving tools, which were Stellite. The lathe shown is fully equipped with anti-friction bearings, with Timken roller bearings throughout the head, and ball bearings in both the gear box and apron. The automatic frictions for both longitudinal and cross feeds are operated by quick-acting, non-revolving snap levers, as shown.

An exclusive feature in this lathe is the automatic oiling system, by which all important bearings are kept lubricated. Another important characteristic is the plunger for locking the spindle



Above—Boring and facing skirt of piston. Diameter of bore is held to size by micrometer dial on cross screw. Center—Wrist pin holes are bored with fly-cutter, held in bar. Hole is reamed with reamer in tailstock. Below—Piston is turned and end faced with tool in front rest. Grooves are cut with four tools in rear. Diameters are controlled by micrometer dial.

when removing chuck or faceplate, removing the strain from gears and shafts.

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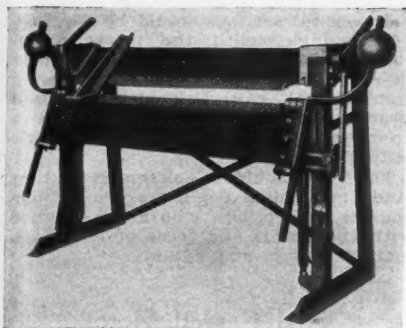
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## Whitney Metal Brake

The Whitney Metal Tool Co., 116 Forbes Street, Rockford, Ill., has brought out a metal brake that is designed just the reverse of the usual machine of this type; that is, the bending apron is below, with the stationary platen above. The lower portion of the clamping rail and bending apron slides on the two end posts.

Two coil springs balance the weight of the bending apron. One feature of the machine is that it is a dual machine; it can be converted, in a few minutes, into a box or pan brake, and as quickly converted again to a bending brake. A box finger is provided at one



Whitney Metal Brake.

end of the machine so that, when fingers are attached to the platen, pans or boxes of any size up to the capacity of the machine may be made. The stationary platen can be moved backward by means of screws so that the box fingers will align properly with the bending apron.

Connecting links on each end of the machine aid in oscillating the lower bending rail vertically. The connecting links make it possible to use the brake either for ordinary bending, or for making boxes and pans. More than 90 per cent steel is used in the construction of the machine; thus it is strong enough to handle thicknesses of metal up to 16 gauge, inclusive. All fitting parts are machined and interchangeable.

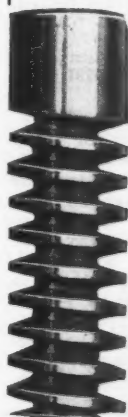
### Furnas Drum Controller

The Furnas Electric Company, 1525 South 77th Street, West Allis, Wis., has designed a controller to meet the demand for compact, drum-type switches

for the smaller sizes of motors. The controller is made in three models; 1 h.p. reversing, 3 h.p. reversing, and 3 h.p. two-speed. The frames are of pressed steel and the segments are of hard copper. Pins, rollers, and cams are of steel, case hardened. Bakelite is used for insulation.

Rotor spindles are of solid bakelite with bearings top and bottom, insuring freedom from insulation failure and ease of operation. The reversing controllers are made in one frame size with two different ratings, the smaller rating having friction indexing device and the

## PERKINS Worms and Gears



insure smoother operation and greater durability for your machines. PERKINS Ground Thread Worms and Gears are produced by specially designed equipment. They are "mirror finished" by a special polishing operation and each gear is made to conform to PERKINS Super Standards of Quality.

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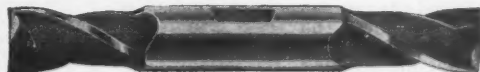
**Perkins Machine & Gear Co.**

151 Circuit Ave., SPRINGFIELD, MASS.

## WEL-DON DOUBLE-END MILLS

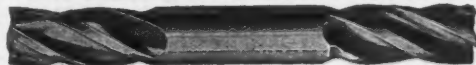
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larger rating having cam and roller indexing. The smaller size is made with brass fingers, and the large size has  $\frac{1}{2}$  in. wide fingers with heavy copper tips.



Style 1 Reversing Drum Controller for 1 h.p. motor

The controllers have three positions; forward, off, and reverse.

Multi-speed controllers are of similar construction. This series is not arranged for reversing, but for two-speed motors with either double or single winding consequent pole reconnected type.

The controllers are finished in machine tool gray enamel with bright red moulded bakelite handle. Metal trimmings and contacts are cadmium plated.

## Blackman-Hill Machinist's Slide Rule

The need which has existed for many years for a slide rule with scales graduated especially for use in making the calculations peculiar to machine shop problems has been met by Blackman-Hill & Co., 1515 N. Broadway, St. Louis, Mo. This company has developed a slide rule that is  $7 \times 2 \times \frac{1}{4}$  in. in size, with scales graduated to enable the user to calculate the proper speeds for work, drill, or cutter, and the relative feed per tooth or per revolution or per minute in milling, drilling, turning, or boring operations.

The rule will also give the approximate amount of power required for a given speed, feed, and cut based on the cubic feet per minute of metal removed. One of the principal advantages of the rule over the ordinary slide rule for making machine shop calculations is that the graduations enable the user to solve problems of power, speed, and feed in one setting, whereas with the ordinary slide

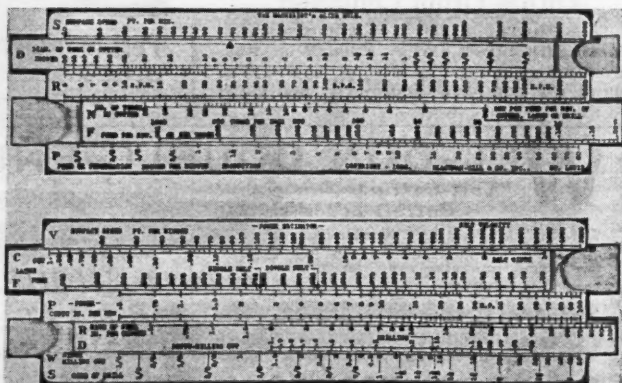
rule, several settings would be required. For example, with the power available as a known quantity, the highest speed and feed possible with a tungsten carbide tool can be calculated and figures obtained as to the increase in production on a given job at a single setting.

The rule should be invaluable to time study men, plant engineers, master mechanics, and others who are concerned with the speeds and feeds of machines, tooling, power, and so on.

## Ideal Geared Motor

The Ideal Electric & Manufacturing Co., Mansfield, Ohio, is now building a geared motor consisting of an electric motor with which is combined a gear reduction unit, as shown in the illustration. The high speed gear is mounted directly upon the motor shaft, making the use of a coupling unnecessary. The unit is available in all gear ratios from 2.09:1 to 376:1, giving output speeds of from 861 r.p.m. to 4.7 r.p.m., using the standard 1800 r.p.m. motor supplied with these units.

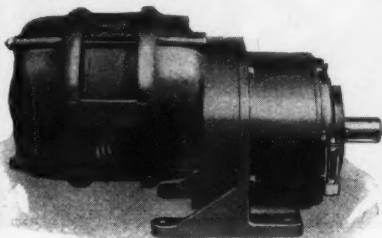
For reduction ratios up to 6:1, the reducer consists of a single-stage helical gear unit. For higher ratios up to and including 24.5:1, a two-stage helical gear reducer is used. For reduction ratios of 30:1 and higher, one stage of helical and one stage of heliocentric gears gives the required reduction. All gears run in an oil bath, and anti-friction ball or roller bearings are used throughout. In the units that employ the heliocentric



Blackman-Hill Machinist's Slide Rule.

gears, the motor is hung on the reducer. In other units, the reducer is hung on the motor. The illustration shows a heliocentric geared motor unit.

Geared motors are supplied in all horsepowers from  $\frac{3}{4}$  to 20. Either open or enclosed type motors are furnished, for 2 or 3 phase alternating current, or



**Ideal Geared Motor.**

for direct current. The motors are of the Ideal "unit type" construction with feet on the end brackets and with standardized rotors and stators which are interchangeable throughout all types. Two, three, or four speed motors can also be supplied.

### Ryertex Bearing

Joseph T. Ryerson & Son, 16th and Rockwell Street, Chicago, Ill., have announced a bearing made from synthetic resin similar to Bakelite and with textile material as the base. The strong belting texture material reinforces the resinoid, which completely fills and saturates it. The composite material is then subjected to high heat and pressure, and at approximately one ton pressure per sq. in. and 340 deg. F., the product sets. The physical characteristics are entirely changed and the bearing is no longer fusible or soluble. It cannot be re-softened by heat, will absorb neither water nor oil, and is resistant to most acids. It is, however, attacked by caustic alkalies.

In making the Ryertex bearing, as the product is called, the pressure and heat is applied through dies which form it to the exact size and type of bearing required while the material is setting. Ryertex is extremely hard and will show a Brinell reading of about 30-40 or a Schlerescope reading of 70-80. The bearing is particularly satisfactory in cases where it is easier to apply water

**BAUMBACH**

**STANDARDIZED**

**DIE SETS**

Semi-Steel

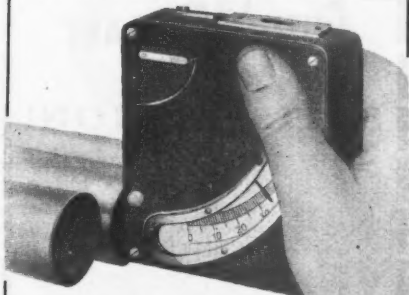
Drop Forged Steel

Standardized Die Sets, embodying many exclusive features, and a listing of more than 95,000 stock sizes, afford a service that is unsurpassed.

*Send For Our New 208-Page Catalog*

**E. A. Baumbach Mfg. Co.**  
1806 S. Kilbourn Ave., Chicago, Ill.

### A Hardness Tester



Never guess about things you can measure. The Durosok measures the hardness of most metals with but little preliminary fuss. Readings can be made in two seconds.

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bulletin  
No. H-4*

**THE R. Y. FERNER CO.**  
Investment Bldg. Washington, D. C.



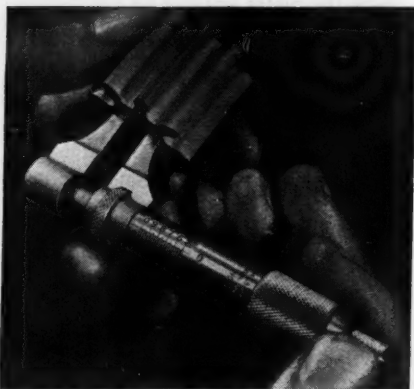
as a lubricant than oil, although it will operate satisfactorily with oil.

The feature of the bearing is the extraordinarily long length of service and decreased power consumption. The saving on the latter item, under favorable conditions, may run as high as 50 per cent.

### Starrett Inside Micrometer for Small Dimensions

An inside micrometer caliper designed to measure directly and accurately the dimensions of holes, slots, or grooves that are too small to admit the standard type inside micrometer has been placed on the market by The L. S. Starrett Company, Athol, Mass. With this micrometer, which is known as the No. 700, all dimensions between 0.200 in. and 1 in. can be measured easily in thousandths of an inch.

As the illustration shows, in this tool are combined the sliding jaws of a slide caliper and the easy-reading thimble and sleeve arrangement of a micrometer caliper. One jaw is fixed; the other is attached to the sleeve and opens or closes as the thimble is re-



Starrett No. 700 Inside Micrometer.

involved. The jaws are cut away to facilitate measuring in close quarters.

The moveable jaw can be locked in any position by a turn of the lock nut. An extension on the thimble speeds up the operation of opening or closing the jaws. The tool has the same sensitive "feel" and comfortable balance as the standard-type micrometer.

### GUSHER COOLANT PUMP

#### SATISFACTION!



MODEL  
ULO

Over 60 machine tool manufacturers have expressed their complete satisfaction with GUSHER COOLANT PUMPS.

This fact is not surprising when one realizes that GUSHERS are simple and durable in their construction and give excellent performance on any type of machine.

**The Ruthman Machinery Co.**

532 E. Front St., Cincinnati, Ohio

### Detroit Stamping Company Obtains "Short-Run" License

The Detroit Stamping Company, 3451 West Fort Street, Detroit, Michigan, has acquired license to manufacture stampings by the method patented by Continental Machine Specialties Corporation. The method mentioned makes possible the production of stampings in small lots without the use of expensive dies, thus reducing costs to the minimum.

### P & W Issues Booklet On Keller Automatic Type BL Tool Room Machine

A booklet describing and illustrating the Type BL Tool Room Machine, made by the Keller Division, Pratt & Whitney Company, Hartford, Conn., has been published by this firm. The booklet contains eight 8½ x 11-in. pages, and is profusely illustrated with pictures showing the machine, various parts and



sections of the machine, and various jobs in process. The text includes an outline of the operating principles, with specifications of the several sizes in which the machine is made. Copy free upon request.

### Bulletin on Red-E Ball Bearing Live Center

The Ready Tool Company, 550 Iranistan Avenue, Bridgeport, Conn., has issued a six-page bulletin describing and illustrating the ball bearing live centers made by this firm. The bulletin tabulates the advantages of the high speed steel center, which is built around a double row angular contact precision bearing that is preloaded so as to positively eliminate internal looseness. It also outlines the features of the heavy duty high speed center, a revolving ball-bearing stop for automatics, and special applications and designs of the ball bearing center. Cross section drawings of the various centers are shown. Copy free upon request.

### Maintaining Production Schedules at Master Electric Co.

(Continued from page 10)

which detects noises utterly unheard by the human ear is connected to the instruments shown on top of the booth. Any motor noise is converted and amplified and registers on the instrument dials in the form of an exact indication of volume for specific comparison. Thus the human equation is removed and definite limits as to the degree of sound allowable for a given type of motor can be rigidly

adhered to. The type of noise produced, if any, usually indicates its exact location.

As the motors pass final inspection, they are carried on the conveyor for their ride to the shipping department, shown in Fig. 11. Each motor is crated and marked for shipment while still on the conveyor and by the time it has reached the shipping platform, it is entirely ready for the customer. From the time the castings were placed on the overhead conveyor until the crate is set onto the shipping platform, no part of the motor has touched the floor nor has it been trucked or carried. Movement of materials has been co-ordinated, waste motion has been eliminated, and the precise production schedule which The Master Electric Company believes is considerably responsible for satisfying customers has been maintained to the minute.

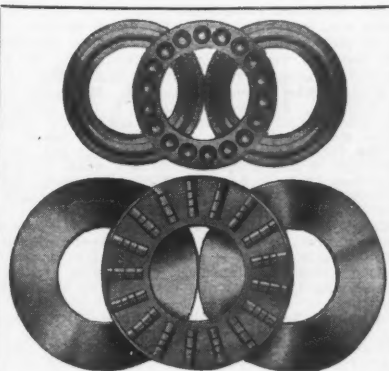


### Mummert-Dixon Facing Heads

8 Sizes—6" to 40"

We can't say much here . . . but if you write for a bulletin we'll show you how this tool will save you money.

MUMMERT-DIXON CO.  
120 Philadelphia Street  
Hanover, Pa.



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Special Bearings, Made to Order.  
Send Sketch or Sample for Quotation.

Catalog Upon Request

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358 Furman St. Brooklyn, N. Y.

## For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

**Checks—Key and Keyless:** Bulletin No. 120A, issued by T. R. Almond Mfg. Co., Ashburnham, Mass., describes and illustrates the line of key and keyless geared nut and ball bearing drill checks made by this firm. Copy free upon request.

**Cut Your Sawing Costs:** "Lenox" hack saw blades and band saws are guaranteed to effect savings on your sawing operations. Write for information to American Saw & Mfg. Co., Springfield, Mass.

**Ames Gages:** Catalog No. 50, issued by the B. C. Ames Company, Waltham, Mass., contains complete descriptions and illustrations of the dial gages, gage heads, upright gages, cylinder gages, dial micrometers, and precision verifiers, special gages and attachments made by this company. Copy free upon request.

**Time Study Watches:** A folder containing illustrations and descriptions of the split-second watches, decimal watches, and other timing watches marketed by Aristo Import Company, Inc., 12 John Street, New York, N. Y., can be had by addressing a request to the firm as above.

**Machine Shop Accessories:** Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

**"Atlas" Bench Lathe:** A 9-in., screw cutting, self-contained, motor-driven bench lathe is now being built by Atlas Press Co., Kalamazoo, Mich. Write for circular.

**Hold Odd-Shaped Pieces Securely:** A vise in which odd-shaped work can be held securely without the need of special jaws or fixtures is described in a folder that has been issued by The Avey Drilling Machine Co., P. O. Box 487, Cincinnati, Ohio. Copy free upon request.

**Greenard Arbor Presses:** Catalog No. 38, issued by the Edwin E. Bartlett Co., Nashua, N. H., describes and illustrates all the various types and sizes of arbor presses made by this firm. Copy free upon request.

**Drop Forged Steel Die Sets:** The economy and other advantages of drop forged steel die sets, which are now being made by E. A. Baumbach Manfg. Co., 1806 South Kilbourn Avenue, Chicago, Ill., are explained in a folder that can be had by addressing this firm.

**Carboloy Tools:** Handbook M32, issued by Carboloy Company, Inc., 2485 East Grand Boulevard, Detroit, Mich., describes the tools made by this firm, and also includes information regarding manufacturing, brazing, and grinding Carboloy tools. Copies free to mechanical executives.

**Abrasives:** Samples of "Alorite" Brand "TP" Polishing Grains for trial may be had without charge by addressing the Carborundum Co., Alorite Division, Niagara Falls, N. Y.

**Gears Of All Kinds** are described and illustrated, with specifications, in Catalog 80, which has been issued by the Chicago Gear Works, 769-773 West Jackson Blvd., Chicago, Ill.

**Mounted Grinding Wheels** for use in small holes such as are found in bushings, dies, gears, tools, etc., are described in a catalog that has been issued by the Chicago Wheel & Manfg. Co., 110 S. Aberdeen St., Chicago, Ill. Copy free upon request.

**Diamond Boring:** The newest methods of diamond boring all kinds of bearings, gears, motor frames, small bushings, and other similar work are outlined in a bulletin that also describes and illustrates three new diamond boring machines. A copy can be had by addressing the City Machine & Tool Works, 1521 East Third Street, Dayton, Ohio.

**Motorize Your Cone Pulley Lathes:** An attachment that can be applied to your lathe with four bolts makes it possible to motorize and modernize your lathes. Write for information to Cushman Wheel Co., 1336 Altgeld St., Chicago, Ill.

**Die Makers' Supplies:** A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

**Steel Spacing Washers:** Milling jobs can be set up quicker by using standard spacing washers, made by Detroit Stamping Co., 3445 West Fort Street, Detroit, Michigan. Write for information.

**H & G Self-Opening Die Heads** for all types of machines in which threading is done are described and illustrated in a catalog that has been issued by The Eastern Machine Screw Corporation, 140-150 Truman St., New Haven, Conn. The booklet also shows the H & G Threading Machines and Chaser Grinders. Copy free upon request.

**"Speed" Spot Welders** for welding metals from 0.0005 in. to  $\frac{5}{8}$  in. thick are described in a catalog that can be had by addressing Eisler Electric Corp., 761 South 13th Street, Newark, N. J.

**The Red Liner** is an automatic machine that inspects gears under conditions similar to those of actual operation, and charts errors on a 200-to-1 scale. Write Fellows Gear Shaper Company, Springfield, Vt., for booklet.

**Performance Data On Swiss Jig Bore:** This 36-page pamphlet shows various types of jobs from a power shovel turntable jig to a television disc, drilled and bored on Societe Genevoise High Speed Precision Bore, giving data as to size of holes, accuracy and time savings. Free upon request to The R. Y. Ferner Co., 1008 K Street, N. W., Washington, D. C.

**Formica Silent Composition Gears:** A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

**Motorize Your Machine Tools:** A compact, roller bearing electric power unit which can be mounted in any position, in sizes from  $\frac{1}{4}$  to 10 h.p., is described in a bulletin which can be obtained by addressing W. C. Furnas, 1525 South 77th Street, West Allis, Wis.

**Stampings of any kind or size** can be obtained from Gerding Brothers, 5 East Third Street, Cincinnati, Ohio. Write for particulars.

**Ball and Roller Bearings**, either journal or thrust, for all purposes and in all sizes, are described and illustrated in catalog No. 9 which has been issued by The Gwilliam Company, 360 Furman Street, Brooklyn, N. Y. Copy free upon request.

**Precision Bench Lathe Work** can only be done on finely-built, accurate machines. The complete line of Horth Precision Bench Lathes is described and illustrated in a catalog that has been issued by Horth Lathe & Tool Company, 60 State Street, Boston, Mass. Copy free upon request.

**Oil and Waterproof Checks:** The J & H Electric Co., 202 Richmond Street, Providence, R. I., is now making a check that is oil and waterproof, and is designed to provide a maximum of holding surface with exceptionally strong and uniform pull throughout. Ask for complete information.

**Threading Machinery:** Complete catalogs of individual bulletins covering the pipe threading and cutting ma-

chines, bolt threading machines, or die heads made by Landis Machine Co., Waynesboro, Penna., may be had upon request from this firm. State size and type of machine or die head concerning which information is required.

**Air-Operated Work-Holding Devices:** A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

**Master Complete Power Drive:** Booklet S210, issued by The Master Electric Company, 104 Davis Ave., Dayton, Ohio, describes and illustrates the Master Geared-Head Motor in service, with applications to all kinds of drives. Copy gratis.

**"Hand-ee" Grinder:** A grinder for use on dies, tools, and other fine work, made to fit the hand, weighing one pound, with plug to operate from light socket, is described in a folder that can be had by addressing the M. C. Tool Co., 120 South Aberdeen St., Chicago, Ill.

**Compound Spot-Facing Tool:** A spot-facing tool retracting, serrated roughing cutters and fixed finishing cutters in the same tool will break up the scale easily and do accurate work. Write for bulletin to Mummert-Dixon Co., 120 Philadelphia St., Hanover, Penna.

**Gall and Roller Bearing Data Sheets:** A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

**"Commercial Lapping for Close Limits and High Production"** is the title of a booklet that discusses hand and machine lapping, types of lapping tools and machines, workholders for machines, preparation of laps, preparation of work for lapping and other important points. A copy may be had by addressing Norton Company, Worcester, Mass.

**Die Making Machines:** How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1450 Maumee Street, Adrian, Mich. Mailed upon request.

**Good Gears of all kinds**—spur, spiral, bevel, worm, hypoid—in fact, any kind or type of gear desired, large or small, machined to an excellent finish and the highest degree of accuracy, may be obtained from Perkins Machine & Gear Co., 151 Circuit Ave., Springfield, Mass. Write for estimates.

**Bench Lathe Mounting and Driving Equipment:** Bulletin 120-A, issued by Rivett Lathe and Grinder Corporation, Brighton, Mass., contains complete descriptions and illustrations of modern and conventional countershaft, individual motor drive jackshaft, and speed box motor drive, also benches, cabinets, oil pans, etc. Copy free upon request.

**Automatic Lubrication:** Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthmap Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

**Steel Stamps and Marking Dies:** Full information as to steel stamps, steel roller dies, embossing dies, and embossing rolls made by the Schwerdtle Stamp Co., 10 Cannon Street, Bridgeport, Conn., can be had by writing this firm.

**Hardening Simple Tools and Parts:** Instructions as to the hardening and tempering of small high speed and carbon steel tools and sections can be had, together with a circular describing the "Electroblast" High Speed Muffle Furnace, by addressing a request to Stark Tool Company, Waltham, Mass.

**Cutting and Grinding Facts:** A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, 1608 Walnut Street, Philadelphia, Penna. Free upon request.

**The Advantages of Abrasive Cutting** by the use of a new type of miter saw as applied to the cutting of bar stock, tubing, metal moulding and so on are told in a bulletin that can be had by addressing The Tannewitz Works, Grand Rapids, Michigan.

**Electrically-Driven Portable Tools:** The "U. S." line of electric drills, die grinders, surface grinders, tool-post grinders, and bench and floor grinders is described in Catalog No. 33, published by The United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio. Copy free.

**"Extra Value" Hack Saw Blades:** Hack saw blades made of an alloy in which molybdenum is used, and which are said to withstand shock and wear to an unusual degree are now being made by Victor Saw Works, Middletown, N. Y. Full particulars will be sent upon request.

**Double-Life End Mills:** Weldon Double-End Type End Mills, made with blades on each end, are described in Catalog No. 6, issued by The Weldon Tool Company, 1426 West Third Street, Cleveland, Ohio. Other small tools made by this firm are also described and illustrated in this catalog.

## Ideas From Readers

(Continued from page 26)

so that the segment can be placed in position in the die. Then the clamp is swung into position over the work, and the press is engaged. The slot is broached in a single operation of the press. The die is rapid in operation, and a smooth, clean finish is obtained.

## Free Trade in Ideas Hurdles Tariff Walls

Offices have been opened by Amerika-Interessen, Inc., Chrysler Bldg., New York, N. Y., to make available to manufacturers in this country devices, processes, and patents that have been devel-

oped and have proven successful in foreign countries, and to make American patents and processes available to foreign manufacturers.

For manufacturers who wish to increase their scope of activity by obtaining business abroad, but are prohibited from doing so by tariff walls, this firm negotiates agreements covering production and marketing rights. This is done by issuing licenses on a royalty basis or by the outright sales of the manufacturing and marketing rights for the country involved. Thus the engineering skill and manufacturing experience of one nation is made available to the other.

It is stated that this work is already under way, a number of German inventions having been placed in England and English developments in Germany. Information can be obtained by writing to the company at the above address.

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\* Space scheduled. See next issue.



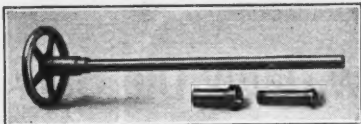
## OUR NEW CATALOG "Grinding Wheels on Shanks"

is now ready. Shows wheels to fit any machine; wheels for anything from steel to stone, from glass to brass—complete assortment of shapes, sizes and kinds.

Gives latest information on grinding wheels useful at 1,000 or 100,000 r. p. m., for getting into places hard to get at, for touching off, for grinding out holes either open or blind. Write today for this new catalog. No obligation.

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100 SHAPES AVAILABLE



### Collet Attachments for your lathes and millers

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Brighton Dist., Boston, Mass., U. S. A.



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### 800 ROOMS WITH BATH

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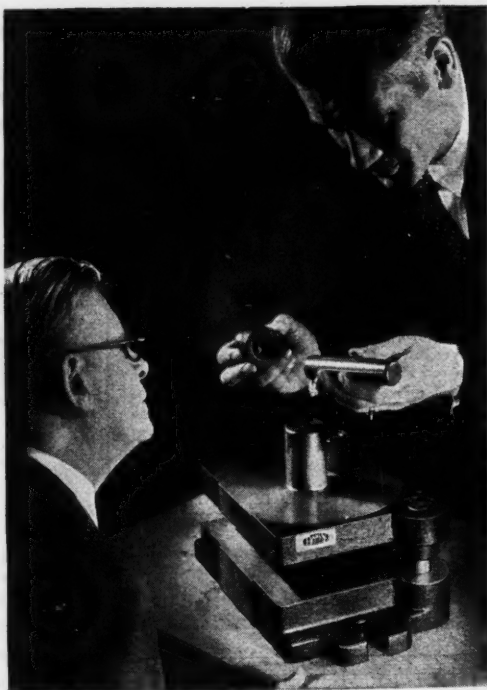
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*Announced early in 1932 . . . . Its success has been instantaneous!*

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If you have not seen the new Danly Commercial Die Set, ask our nearest

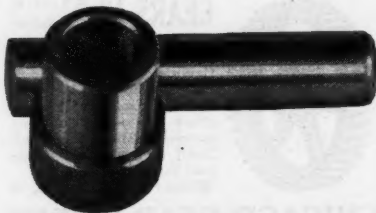
branch office to show it to you. Check the new pin and bushing combination—the high degree of accuracy and finish—the close working tolerances.

Then ask the price. Don't tool up till you see them.

**DANLY MACHINE SPECIALTIES, INC.**  
2122 South 52nd Avenue Chicago, Illinois

*Branches:*

Long Island City, N.Y., 36-12 34th Street  
Detroit, Mich., 1549 Temple Ave.  
Cleveland, Ohio, 1444 E. 49th St.  
Dayton, O., 226 N. St. Clair St.  
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**DANLY  
COMMERCIAL DIE SETS**



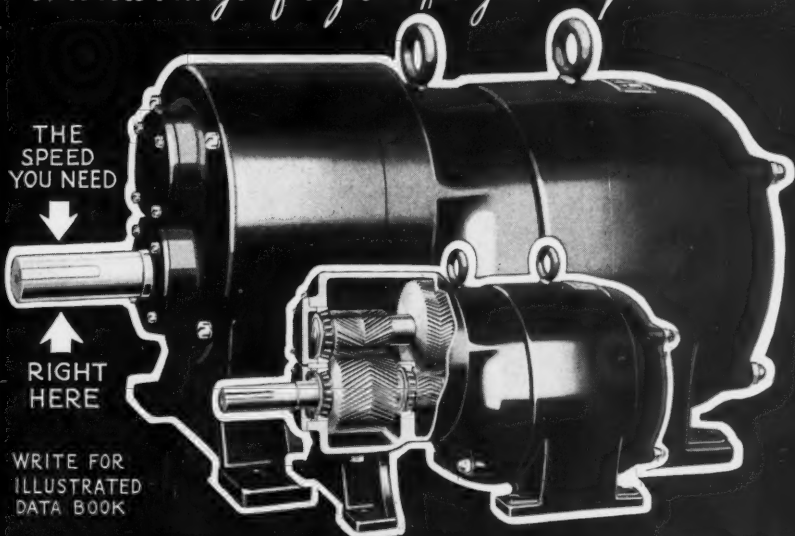
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*A wide range of sizes to fit your requirements*



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today.*

struction is the result of countless years of efforts to improve it as it affects the performance of the drill in the hands of the speedy mechanic.

If you require only an ordinary electric drill, then you do not really need a U. S. But if you want, as most manufacturers do, a drill beyond any compromise of cost or quality—then you want only a U. S. It is made especially for you.



**THE UNITED STATES ELECTRICAL TOOL COMPANY**  
**DRILLS - GRINDERS - BUFFERS**

2471 WEST SIXTH STREET

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